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Ten Years' Progress in Management, 1950–1960

Foreword

WALKER L. CISLER

President, The American Society of Mechanical Engineers
Fellow ASME

PROGRESS IN MANAGEMENT! The industrial successes and failures of the last fifty years bear pertinent witness to the fact that industrial existence does, in essence, depend upon PROGRESS in the use of the skills of management. Success and longevity in the business world are impossible unless progressiveness is inherent in the application of managerial skills.

This report, the fifth of a series, portrays the latest decade of managerial advancement. It is both a chronicle of events and a portent of things to come. It has been this decade which has seen management approach its own role in the fullest sense—a management which is learning to direct with surety and accomplish with precision; a management which leaves a record of growth and broadened product lines, but also one which sounds a note of warning for the future.

Competition of foreign products, often prepared for under our own guidance, is posing problems of finance, sales, and quality. Continued growth of required "fringe benefits" causes introspection by the manager. The ever-widening need for more and better equipped management personnel has drained the market of needed manpower. These and similar problems concern business heads today.

The engineer of today faces a better field for his services but also has more hurdles to get over. There is no smooth road to success, yet success does come to those who grow with the times and who are able to develop conceptual thinking. The requirements of the individual, the corporation, the state, the nation, and the world all nibble away at the energies of the man—and such absorption of his talents allows only the strongest and best equipped to last. Engineers usually are so equipped.

The philosophy of management which places managerial responsibility on the line management people, which refuses to allow it to be dissipated by staff suction, is one which over the last decade has stood the test.

There is growing recognition of management as a profession. I prophesy that the next decade will bring much greater progress in this direction.

A new era in the so-called "practices of general management" is being hewed out by the scientist, the research man, the professor, and the practitioner. Departmentalizing the practices is rapidly being accepted as a valid approach to general management.

Operational management has no longer to take a back seat as the stepchild of the managerial field. Neither can it now be looked upon as the ultimate answer to all of management's ills. A healthy balance between the scientific and the "natural" approach must be reached.

The growing effect of electronics in management has made an impact on companies such as has never previously been felt by a single change in techniques. Revolutionary ideas cause complete reversals of established and long time practices as well as to cause entirely new practices to be developed. More concern than ever before has been shown in the effects of these changes on employee morale. Organized labor and management together must be in the vanguard to jointly make such transitions smooth and acceptable to both parties.

An epoch-making change is under way in the educational systems of higher learning. New concepts and ideals are being fostered. New approaches to old problems are being studied and a newer philosophy of management is being taught to the students. Much of this change has stemmed from the managerial education worked out by our colleges and universities with management practitioners from the field. These, in conjunction with professional consultants and management organizations, are helping to achieve a better understanding of the management problems of today.

All of these subjects, as well as the trends for the future, are adequately treated in this volume.

On the subject of International Progress in Management, a quote from my address given before the 1960 annual meeting of the Council for International Progress in Management is pertinent here:

"We have grown accustomed to being so successful a nation, so well provided with natural resources, so financially strong, skillful, original, highly productive—a prime demonstration of all the advantages that accrue to a people who enjoy political liberty and personal initiative under a fluid and resourceful system of competitive enterprise.

"Through the application of our physical, spiritual, and technological advantages, we have achieved, as a nation, the highest standard of living ever secured on this planet.

"Our industrial and managerial development has been widely followed, and we have achieved a surplus of capability that has permitted us to extend financial assistance to other nations on a scale that exceeds even what we ourselves might have thought possible only twenty years ago.

"Many technical aid missions have visited our shores and we have sent many experts abroad. We have also maintained a defensive military structure, at great expense, as our contribution to the defense of all the gains that men hold dearly in the free world. We have made commitments to great causes, and used our strength as a champion always should, with generosity and with a genuine endeavor for peaceful co-operation with others.

"But now we find that the champion is being challenged not only by some of the inescapable laws of economics, but by another and a very capable nation with extensive resources, where human endeavor is tightly organized to serve the purposes of an all-powerful state. . . .

"The question on our side is, How well are we going to do in the decade ahead? How are we going to make our economic system function most effectively and efficiently?

"Considering the internal affairs of our country, we as a people must find ways to get the most out of what we do for

ourselves. Considering our international responsibilities, we as a people must find ways to assure our continued capacity to help others by maintaining our own healthy position in world markets by showing that we can compete with the best of them. In other words, there is work to do, and we must do it more effectively. This is a challenge to every individual and to management as well, because all this has to be managed. . . .

"American management must assess its own productivity to compete with the management of other nations. It is also important for our management people to have opportunities to meet with their colleagues in other countries. I think that this is perhaps the quickest way to give a man a new dimension in his thinking, an appreciation of how the rest of the world lives, what it is doing, what its needs are, what its further potentialities may be.

"Such experiences may also show how we can compete in that ancient and yet ever new form of international co-operation known as world trade, which is also in the nature of a scoreboard on productivity and the effective use of capital, nation by nation. Nor may we forget the needs of the far greater part of the world, made up of nations that are not associated with any of the economic groups which I have discussed. These represent the larger part of the human race, about two billion people, in nations with limited industrial development.

"There are serious imbalances that disturb the world in this respect, and which make it harder for the individual nations to make progress without various forms of assistance. These imbalances concern the unequal distribution of population, natural resources, food, energy, industries, and capital. Trained personnel and educational facilities are not so much an imbalance as a definite need almost everywhere. These great human needs present a challenge to all the industrial nations and their citizens, and this means that in the long run it is a management problem.

"Added to all of our other problems, I think we have good reason to seek the means for making our nation more productive in the use of all of the wonderful advantages that we enjoy. It is time to speak out and go to work. And if we will do this, I am sure that the outcome will be most favorable, and that the challenge will be met."

The editors of this report, Prof. Oliver J. Sizelove and Marshall Anderson, have called upon the finest authorities and writers, both in and outside the profession, to formulate a cohesive decadal report. Professor Sizelove is Chairman of Department of Management Engineering, Newark College of Engineering. His own writings in the field of management as an educator and professional engineer as well as his many years of professional society activity have contributed importantly to the store of experiences in this area. Marshall Anderson is Consultant, Organization Development, Management Consultation Services, General Electric Company. He has made contributions to the Society's management meetings and his Company's Advanced Management Course at Crotonville. He also brings a background of engineering and management experience in the design, manufacture, and product planning of turbines and electrical equipment in contributing to the preparation of this report.

We are indebted to the Management Division of the Society for adding another chapter to this record and for consolidating these reports into the "Fifty Years' Progress in Management" report.

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Management's Past—A Guide to Its Future[1]

Of What Use Is History

History serves many purposes—some more practical than others. By seizing an example from the past, it may be possible to solve a problem in the present and avoid another in the future. Truly, the unyielding past is all that we really know about the changing present.

History is more than an integral part of the educated person's background; it is the *sine qua non* of mature thinking. It is only by a study of history that the work of those who came before us—and, eventually, the work that we ourselves do—can be examined objectively. Under history's microscope, the "politician" becomes the "statesman" only if he is deserving of that honor, and, in some cases, the "captain of industry" may very well be shown as a figment of the imagination of a successful publicity campaign. History does more than record and evaluate what our predecessors did and thought. It makes us know the complexities of the accomplishments we so often take for granted. Most important, it often furnishes the spark to light our own paths.

We cannot overlook history any more than did the Babylonian "accountant" who kept his records in cuneiform style with a reed and some soft clay or any more than does the present practitioner with punched tape and electronic devices.

Management's Beginnings

Reference is often made to Collier's "Outline of General History," published in Scotland almost a century ago; particularly to the title of its first chapter, "Adam to Babel." Unfortunately, management does not have so definite a beginning. Hopefully, its progress may be said to be a little beyond such utter confusion.

When and where *did* management begin? Using the Bible as a reference source, we can find the Principle of Exceptions expounded by Jethro to his son-in-law Moses (Exodus 18: 12–26), and we can detect aspects of forecasting, planning, and personnel selection in Joseph's interpretation of Pharaoh's dream (Genesis 46: 15–43). Alford, ASME's great recorder and interpreter of management history, found minimum wage rates among the Babylonians (1956–1916 BC), division of labor among the Chinese (1644 BC), and the transfer of skill in the writings of Aristotle. Coming to more modern times, The British Management Review shows the Principle of Overhead in use in 1591, and Urwick's "The Golden Book of Management" lists an amazing array of management techniques (market research, planned site location, planned machine layout, executive development, and so on) that were to be found, before 1800, in the Soho Foundry of Boulton, Watt & Co., where they were instituted by the sons of the steam-engine pioneers. Then, too, in England, during the earlier years of the 19th Century, there were Robert Owen and his New Lanark accomplishments, and Babbage [1][2] and his studies on "The Economy of Machinery and Manufacturers" (1832). In France, for example, there were Perronet (the pin manufacturer who was well acquainted with division of labor), Coulomb (the physicist who was not unacquainted with the stop watch), Saint Simon (for whom "France was to be turned into a factory and the nation organized in the mode of a vast workshop"). And there were others.

Where, then, can we start? No matter where we attempt to begin, it will be more than likely that an earlier example can be found. Oliver Sheldon [2], tracing "The Development of Scientific Management in England" ascribed to:

"Each generation . . . its scribe who thought scientifically about the ploughing of the soil, the throwing of the shuttle . . . Then came the day when the ploughmen, the weaver . . . discarded the old tools of their crafts, and strode amazedly into the towns where the new factories reared their ugly forms . . . So finally, the torch was handed on from one generation to another, till, amid the immense structure of American industry it passed to the hand of Frederick Taylor."

Yet Taylor, himself, claimed no monopolistic right to or authorship of management, whether it was "scientific management," or any other kind. Before the Special Committee of the House of Representatives to Investigate the Taylor and Other Systems of Shop Management, during the session on January 25, 1912, Taylor [3] said:

"I have had a very great deal to do with the development of the system of management which has come to be called by certain people the 'Taylor system,' but I am only one of the many men who have been instrumental in the development of this system."

And, at the evening session, five days later, he said:

"My gracious I do not believe that there is any man connected with the scientific management who has the slightest pride of authorship in connection with it. Every one of us realizes that this has been the work of 100 men or more, and that the work which any one of us may have done is a small fraction of the whole. This is a matter of large proportions, and no man counts for much of anything in it. It is a matter of evolution, of many men, each doing his proper share . . ."

Despite the futility of any search for a beginning point or an author, one fact seems fairly evident: Those practices which we now identify under the "classic" management category have been with us for a long time.

What Is Management?

If it is not easy to find universal agreement as to its genesis,

[1] Part of the report, "Ten Years Progress in Management, 1950–1960."

Contributed by the Management Division and presented at the Winter Annual Meeting, New York, N. Y., November 27–December 2, 1960, of The American Society of Mechanical Engineers. Manuscript received at ASME Headquarters, July 26, 1960. Paper No. 60—WA-67.

[2] Numbers in brackets designate References at end of paper.

one will not be very surprised to discover a similar lack of agreement as to the term "management" itself as well as to what it means.

Among the terms that have been used and, as a matter of fact, are often still used are: management, scientific management, productivity, rationalization, administration, organization, *organization scientifique, Wirtschaftlichkeit, Betriebslehre, Wissentschaftliche (or Wirtschaftliche) Betriebsfuhrung, organizacao racional de trabalho, racionalizacion del trabajo, organizzazione del lavore, rationel* (1) *organisation, rasjonell organisasjon,* and (alas!) efficiency. Although a goodly number will take issue with the last named term, some will take issue with the others, too.

Thus, on the basis of Sheldon's [4] definition, ". . . rationalisation is that form of industrial combination which is undertaken with the object of widening the scope for the application of scientific management to the extent of whole industries . . .," Person insisted: "Starting from the opposite poles scientific management and rationalization are apparently moving each toward the other."

Again, when Fayol's [6] great work, "Administration Industrielle et Générale," was first translated into English, in 1929, by Conbrough, he translated "administration" as "administration." However, in the Storr's translation twenty years later, it became "management," an action which Urwick [7], in his Foreword, regretted but which, he agreed, was accurate, since "the activity which Fayol discusses in this book is unquestionably the activity popularly described in the English speaking countries as *management.*" Unfortunately, the word, "management," has taken on many meanings in popular usage, and the dictionaries include such terms as "cajolery" and "trickery" among them. Urwick very correctly objects to the many ways in which it is used even by the practitioners; as a noun, it identifies a mental attitude, an activity, a body of knowledge, a group of persons. Its use as an adjective fares no better, and here it meets head-on the term "managerial." The French, incidentally, had their own difficulties, and when Le Chatelier translated the writings of Taylor, there being no exact equivalent of our "management," he used "*l'organisation scientifique du travail,*" a term which, in France, sounded very much like that used for the labor organization. Perhaps the time *is* ripe for a glossary standardizing management terminology.

Certainly something should be done to consolidate the definitions of Sheldon [8], Schulze [9], and others, and to collect and standardize the many more terms that have come into the field during the passing years. In this regard, it may well be the engineers to whom the task might properly fall. And, of all the engineers, it may well be the Management Division of ASME where the work may be accomplished. Its pioneering work on an *Industrial Engineering Terminology* may well be an indication of its potentiality.

As a matter of fact, as early as 1921, the Management Division asserted:

"Management is the art and science of preparing, organizing, and directing human effort applied to control the forces and to utilize the materials of nature for the benefit of man."

Perhaps the time has come for a re-examination of even this definition, now that almost half a century has passed and, more important, for the establishment of some stabilizing force for the adoption and maintenance of terms which will be understood and accepted by all. Definitions in human thought are not unchanging, and the proper maintenance of standards is one of the many tasks that the engineer ought to do well.

ASME and Management

ASME's interest in management came very early, for its first president, Thurston [10], in his Inaugural Address of 1880 declared:

"The Society will have much work to do as a union of citizens having important interests confided to them, and its promise will lie no less in the field of social economy than in that which has reference only to the individual interests of its members."

More specifically, however, in 1886, Towne [11] delivered his paper, "The Engineer as Economist," and he said:

". . . It will probably not be disputed that the matter of shop management is of equal importance with that of engineering, as affecting the successful conduct of most, if not all, our great industrial establishments, and that the *management of works* has become a matter of such great and far-reaching importance as perhaps to justify its classification as one of the modern arts . . . A vast amount of accumulated experience in the art of workshop management already exists, but there is no record of it being available to the world in general, and each old enterprise is managed more or less in its own way, receiving little benefit from the parallel experience of other similar enterprises, and imparting as little of its own to them . . .

"Surely this condition of things is wrong and should be remedied. But the remedy must not be looked for from those who are businessmen or clerks or accountants only; it should come from those whose training and experience has given them an understanding of both sides (viz., the mechanical and the clerical) of the important questions involved. It should originate, therefore, from those who are also engineers, and for the reasons above indicated, particularly from mechanical engineers. Granting this, why should it not originate from, and be promoted by, THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS?"

In this manner, then, ASME was committed to a concern for management problems. Little wonder then that, by such a commitment, Person [5] insisted that "A convenient milestone to mark the beginning of this . . . (management) . . . movement was Henry R. Towne's classic paper, 'The Engineer as Economist.'" Thus, ASME became the early rostrum of management and, by 1920, officially adopted a related recommendation:

". . . that Industrial Engineering is a major subject for consideration by the Society and shall be placed on par with all major technical subjects."

Taylor and the 1912 Report

For almost the score of years that followed Towne's paper, numerous discussions on management practices took place under ASME auspices. Wage plans, mnemonic systems, tool-room organization, inventory problems, and so on, were considered. Generally they were treated not as an integrated problem but rather as several isolated problems. Among those who were impatient with this approach was Frederick W. Taylor [12], the man who eventually became known as the "father of scientific management."

Convinced that management ought to be treated as an integrated whole, Taylor was anxious for the answer to what he considered the really basic problem: What is a fair day's work? And he introduced this problem under the guise of "A piece-rate system" in 1895, even though few were ready for his over-all treatment. He tried again in 1903 with his "shop management," and again he was not too successful. Despite the universal acclaim of his ASME Presidential Address "On the Art of Cutting Metals," he still felt that his fair day's work question needed an audience. And, when Taylor brought his views together in "The Principles of Scientific Management" and found this paper buried in an ASME paper committee, he impatiently published an edition himself and distributed a copy to each member of the Society.

Taylor's views came from the very realistic environment of his shop experience. After preparing for Harvard at Phillips-Exeter, he abandoned a proposed study of law because of a vision impairment, and took on an apprenticeship as a machinist

and pattern maker and, then, after the Panic of the 1870's he went to work at Midvale as a laborer and eventually as clerk, machinist, gang boss, and chief engineer. Here he made an outstanding discovery; the plant was being run by the men and not by the owners and managers. Having been on both "sides of the fence," he was convinced that output was "limited . . . to about . . . one-third of what we could very well have done," and he felt that this was deliberate as well as natural. In this "piece-work fight that lasted for nearly three years," he noted in his "Testimony" [3], he was well aware of the ". . . worry, meanness, and contemptibleness of the whole damn thing.

"This life was a miserable one and I made up my mind either to get out of the business or to find some remedy for this unbearable condition."

He did not condemn the attitude, for he asserted it was due to many things—industry's mechanization, inability of management's planning and supervision to keep pace with specialization, unemployment of the depression, improper cutting of rates by some managements, and mutual distrust. Hence:

"When I came to think over the whole matter I realized that the thing which we on management's side lacked more than anything else was exact knowledge as to how long it ought to take the worker to do his job."

Although Taylor's best presentation of his own views is in his "Testimony" [3] in 1912 before the congressional investigating committee, Person, in a publication [5] for the Taylor Society, assembled some statements made by Taylor in three of his written presentations "A Piece Rate System. A Step Toward Partial Solution of the Labor Problem" [13], "Shop Management" [14], and "Principles of Scientific Management" [15], as showing Taylor's "growth in breadth of vision and capacity for generalization as he came to be the central figure in the management movement."

In "A Piece Rate System" (1895) . . . a summary of conclusions, of which the most important are the following:

1 Wages should be paid to men, not to positions.

2 Rate-fixing should be based on accurate knowledge, not guess.

3 Rates based on exact observations are more uniform and just.

4 With rates so established, "manufactures are produced cheaper . . . while at the same time the workmen earn higher wages . . ."

5 Wages based on exact knowledge develop better workmen . . . remove motives for soldiering, promote a friendly feeling between the men and their employers . . .

In "Shop Management" (1903) . . . the first object in management is to unite high wages and low labor cost . . . this object can be most easily attained by . . .

(*a*) A large daily task . . .
(*b*) Standard conditions . . .
(*c*) High pay for success . . .
(*d*) Loss in case of failure . . .

In "The Principles of Scientific Management" (1911) . . . Scientific management, in essence, consists of a philosophy, which results . . . in a combination of the four great underlying principles of management:

First. The development of true science.

Second. The scientific selection of workmen.

Third. Their scientific education and development.

Fourth. Intimate friendly co-operation between the management and the man.

No account of the development of management—no matter how brief—can neglect mention of Taylor, *the man*. Thus, although Taylor died in 1915, as recently as 1958, Urwick [16] felt it necessary to challenge some statements appearing in a recent book [17] on scientific management and the unions. To many of Taylor's disciples—Barth (Taylor's mathematician and "systems man"), Diemer (Taylor's choice to head, at Pennsylvania State College, the country's first department teaching "mechanical engineering from the standpoint of production rather than machine performance"), Babcock (who introduced the Taylor system to the automotive industry), Metcalfe (whom Taylor praised for "the card system of shop returns" at Frankford Arsenal), Sanford Thompson (time-study developer and designer of the "watch book"), Hathaway (Taylor's "best all-round man in the movement"), Cooke (Taylor's staunch advocate)—there was little room for disagreement. On the other hand, other contemporaries—Gantt (the "humanitarian" of the movement), Gilbreth (the observer of the worker from both the outside and the inside), Hoxie [18] (who tried to reconcile the conflict between labor and some scientific management advocates, who succeeded in getting AFL and Emerson approval, but who, on Taylor's opposition, added an appendix to his book incorporating Taylor's views)—found earnest differences in methods and concept.

Although some of those who worked with and knew Taylor personally might question his tact and diplomacy, none would deny his earnestness, his sincerity, and his dedication to his high-principled goal. Unfortunately, there were, however, others, who, through either ignorance of his purpose or misunderstanding of some of his methods or even overzealousness on their own part, brought serious discredit to the movement. The "efficiency experts"—the opportunists whom the ASME 1912 Report took to task—performed serious damage to the movement about which the lay public had only superficial knowledge. The quiet dignity of the Conference at the Tuck School at Dartmouth [19] in 1911 plus the brilliant analysis by Brandeis of scientific management (even the coining of the name came at this time) plus Emerson's testimony that an "economy of . . . not less than $1,000,000 a day" could be achieved by the railroads if they were to adopt a "proper efficiency system or scientific management" brought much favor to the movement. On the other hand, other things had an opposite effect: Labor's opposition, the strike at the Watertown Arsenal, and, of course, the aggressive "efficiency experts."

It was in this atmosphere—which also included Taylor's withdrawal of his paper on "The Principles of Scientific Management"—that an ASME Committee, with Dodge as chairman and Alford as secretary, was appointed to report on the "Status of Management."

Present State of the Art of Industrial Management—1912

The task of preparing this Report was not easy. For example, information was most difficult to obtain, since not many executives for whom Taylor had installed his system were willing to give much, if any, help. As Copley [12] asserted, these people had little "missionary zeal" for Taylor and his system, and all that they were concerned with was "confined to the benefits they could derive from it."

The Report emphasized the growing interest in Management of business executives and employers, the opposition of labor, the increasing governmental concern (e.g., congressional investigation of management systems in federal arsenals and shops, civilian investigation of management in the Navy yards, the prohibition of time-study and premium payment plans in government work), the growing management literature, the unfortunate rise of the "efficiency experts"—but, most of all, the Report stressed the fact that management principles could be applied to unskilled work (Taylor's shoveling experiments) as well as to ancient trades (Gilbreth's bricklaying studies).

The Report gave the background of the development of man-

agement—the increase in labor-saving machinery, the basic aspects of the division of labor principles as presented by Adam Smith and other British economists, the contention of Babbage that the manufacturer could consequently obtain the "precise quantity" of skill needed, the transference of skill from the inventor to the machine, the development of analytical methods and operations (e.g., Smith's listing of manufacturing operations, Babbage's tables of operations, operator cost, and tool and material cost, Coulomb's time-study work), and the increased interest in the worker (as exemplified by incentive wage plans, accident prevention, and working-conditions improvement).

Of great importance, too, was the increase of questioning, investigation, and a search for facts. Motion and time study executed such investigations, planning departments applied such such facts, and wage systems stimulated co-operation. Yet, this should not be interpreted as meaning that, at the time, there existed a "science rather than an art of management," and the Report indicated that "labor-saving management" (rather than "scientific management") might be a more meaningful term to cover the "new" fundamental element, viz.:

"The mental attitude that consciously applies to the transference of skill to all activities of industry."

This transference—and it was meant to be applicable to *all* activities and not limited to transference of skill to a machine—was put into effect by "three regulative principles," first stressed by Church and Alford in a previous publication [20]:

"The systematic use of experience.
The economic control of effort.
The promotion of personal effectiveness."

These were fundamental, for inherent in them were the setting up and use of records and standards, the application of skill by executives, and the understanding of human workers.

Although the 1912 Report has since come to be accepted as one of the milestones in management literature, it was bound to beget, at the time, some differences of opinion. Some of these were valid and important, some valid and of questionable importance, and some quite invalid and unimportant.

Consider, for example, the "Minority Report," which was written and signed by Voughan, one of the eight members of the Committee. Gantt, in discussing it, said:

". . . a careful reading seems to indicate that the writer is fundamentally in accord with the majority, except that he wishes to take a shot at the statement made before the Interstate Commerce Commission that the railroads were losing a million dollars a day."

Again, C. B. Thompson felt that the Report did not take a vigorous stand against labor's organized opposition. Although Taylor's discussion, for the most part, consisted of a further exposition of scientific management, he confined his criticism to a feeling that the Report's reference to time studies, as presently used, he insisted, were really "begun in the machine shop of Midvale Steel . . ."

In general, however, there seemed to be general agreement—among such leaders as Taylor, Gantt, Gilbreth, Church, Hathaway, and others—that the Report had essentially presented the current status of management and the fundamental aspect of the movement, the notion of mental attitude, and the transfer concept.

There were, however, among the discussers of the Report, two leaders whose accomplishments—on account of their own validity as well as the fact that they served as a fountainhead of much of the progress that came later in the movement—deserve special attention in any survey of management, no matter how brief—Gantt and Gilbreth. To both, the "human element" was a matter of great concern.

Gantt, Industrial Relations, and "Service"

To many of today's practitioners, the name of Gantt—in spite of the fact that his principles serve them, industry, and society as major goals and ideals—is mostly confined to a production-control chart. Certainly this aspect of his work is a most important contribution. (It began with a daily balance chart, a cost-control graph, and an idle expense chart, but, in its final form, its great contribution was in its use of *time* rather than *quantity* as its variable. And, in this connection, the reader is strongly urged to examine the first chart made by David Porter [21] as well as the book by Wallace Clark [22] which presents the chart's universal applications.) But the chart, his task and bonus plan, his contributions to the mechanics of management (like "order point"), these were only some of the aspects of his basic philosophy of management.

Associated with Taylor for a long time—e.g., at Midvale and Bethlehem, where he remained after Taylor left—Gantt was also concerned with the application of scientific methods. As the movement grew and as time passed, the emphasis began to change. Taylor felt that the improvement of the worker's position could come from process analysis, work planning, proper organization, and, of course, financial incentives. Gantt and his humanism went beyond this. Not only was his bonus plan [23] less severe than Taylor's for a worker not reaching task, but it provided a reward for the accomplishment of task in the alloted time and a bonus for completion in shorter time. But even this is only a small part of Gantt's work. Perhaps it would be wise to present some of his concepts:

His lectures at Yale [24] deserve first mention, for here he attempted to innoculate contemporary management with a greater concern for the human element and a consideration of incentives other than the purely financial ones. He attached so much importance to some of the views on workmen training [25] that he repeated some of the important ones in his "Work, Wages and Profits" [26]:

"A system of management may be defined as a means of causing men to co-operate with each other for a common end. If this co-operation is maintained by force, the system is in a state of unstable equilibrium, and will go to pieces if the strong hand is removed. Co-operation . . . needs no outside support . . .

"The general policy of the past has been to drive, but the era of force must give way to that of knowledge, and the policy of the future will be to teach and to lead, to the advantage of all concerned."

The book expressed many more of his views:

"The man who undertakes to introduce scientific management and pins his faith to rules, and the use of forms and blanks, without thoroughly comprehending the principles upon which it is based, will fail . . .

"This book is an effort to explain the principles of Modern Industrial Organization. . . . in discussing the relations between employer and employed, we must recognize the fact that, in the majority of cases, men still act on the principle that 'they should take who have the power and they should keep who can.' . . . This is true whether you are speaking of employer, or employed . . .

"As long as the interests of the employer and employee seem antagonistic there will be conflict . . . Until we can find some means of doing away with antagonism, the conflict will continue. Our search, then, must be for such means . . .

"As long, however, as one party—no matter which—tries to get all it can of the new wealth, regardless of the rights of the other, the conflicts will continue . . .

"As business increases in volume, profits will normally increase correspondingly; but there are only two ways of substantially increasing the profits per unit of output—one by increasing the selling price, the other by reducing the cost of production . . .

"With increase of prices comes higher cost of living; with higher cost of living comes demand for higher wages; with higher wages (unless accompanied by greater efficiency) comes higher cost of production. Then, to maintain the same profit under the new conditions, we must again increase our selling price, and the cycle repeats itself . . .

"Let us now consider the other alternative—that of reducing cost . . ."

It is probably in the book, "Organizing for Work" [27], which appeared in 1919, the year of his death, that Gantt expresses best his concern for "service" and for "industrial democracy." In the opening chapter, "The Parting of the Ways," and in the closing one, "The Religion of Democracy," he maintained:

". . . our modern civilization is dependent absolutely upon the service it gets from the industrial and business system . . . (There has arisen a) . . . conflict of ideals which is the source of the confusion into which the world now seems to be driving headlong. *The community needs service first, regardless of who gets the profits, because its life depends upon the service it gets . . .* The *. . . business system had its foundation in service, and as far as the community is concerned has no reason for existence except the service it can render . . .*

"I say, therefore, we have come to the 'parting of the ways,' for we must not drift on indefinitely toward an economic catastrophe such as Europe exhibits to us . . . In Russia and throughout eastern Europe, the community through the Soviet form of government is attempting to take over the business system in its effort to secure the service it needs . . . We all realize that any reward or profit that business arbitrarily takes over, and above that to which it is justly entitled for service rendered, is just as much the exercise of autocratic power and a menace to the industrial peace of the world as the autocratic military power of the Kaiser was a menace to international peace. This applies to Bolshevists as well as to Bankers . . .

"America holds a unique place in the world and by its traditions is the logical nation to continue to develop its business system on the line of service. What is happening in Europe should hasten our decision to take this step, for the business system of this country is identical with the business system of Europe, which, if we are to believe the reports, is so endangered by the crude efforts of the Soviet system to make business serve the community.

"The lesson is this: the business system must accept its social responsibility and devote itself primarily to service, or the community will ultimately take it over in order to operate it in its own interest . . .

"Reward according to service rendered is the only foundation on which our industrial and business system can permanently stand. It is a violation of this principle which has been made the occasion for socialism, communism, and Bolshevism. All we need to defeat these "isms" is to re-establish our industrial and business system firmly on the principles advocated by Abraham Lincoln in 1847, and we shall establish *an economic democracy that is stronger than any autocracy.*

"Moreover, it conforms absolutely to the teachings of all churches . . .

Gantt's motive was, according to Alford [28], his disciple and biographer, the biblical quotation that appears on the marker on Gantt's grave: "I am among you as he that serveth."

Gantt's influence was great, and his call has, in recent years, taken on renewed significance. Among his many advocates was Alford, the author of the 1912 Report [29–30], who, mindful of Gantt's criticism of the underemphasis of the personnel problem, wrote another report in 1919 for ASME, dealing entirely with "The Status of Industrial Relations." The 1919 Report came at an opportune time, when, despite ". . . our witnessing the payment of higher wages than were ever before known in this country, there is a feeling of uneasiness and unrest throughout our entire nation, labor is making many demands . . ." Quite properly, but still unfortunately, the 1919 Report is concerned mainly with developments in the U.S.A., and the accomplishments of Watt, Boulton, Owen, and even the more contemporary Rowntree, for example, are not mentioned.

Nevertheless, the Report correctly states that most of the remedies set forth during the closing years of the 1800's and the beginning years of the 1900's were profit-sharing and wage-incentive plans. Supplementing the Report, some instances of the first category can be found in the plan that the Pennsylvania Railroad had in 1868 in connection with a material waste program [31] and in the program adopted by Towne in 1887, two years before he presented his paper [32] at ASME. As for the wage plans, in addition to those of Taylor and Gantt, there were those of Halsey [33], of Rowan [34], and of Schoenhof [31], who, in 1892, in his "The Economy of High Wages," "had resurrected John Stuart Mill's old principle that the high individual wages may mean cheap labor as a whole."

Lytle [31] has recorded and criticized the unhappy spectacle of the efficiency experts who, with no regard to proper standardization, would install a new incentive plan, "make a temporary showing, collect sizeable fees, and rush to other clients before the real trouble started to develop." It may not be amiss to point out here that it was Lytle, who first, in the Ronald magazine, *Management Engineering* (May, 1922), and then in the first of Alford's handbooks [35] (1924), and finally in his own text, developed a method for studying incentive plans, which neatly combined all their elements so as to be capable of uniform representation (both algebraically and graphically), and thereby properly called to halt a seemingly never-ending stream of individual plans bearing the individual names of their inventors.

The 1919 Report was concerned with the impending "evils" of "absentee" directorates which, located in a major city miles away, controlled plants throughout the country. Surprisingly, the Report failed to emphasize the fact that the problem was changing from one of employer-employee to one of management-labor. Perhaps, this phase was, as yet, not so apparent as it was when Juran commented on a December, 1947, advertisement, signed by President Gifford on "The Responsibility of Management in the Bell System" and the "Management—A Trusteeship" concept.

However, the 1919 Report did note the rise of interest in safety engineering and industrial accident control, the allocation of accident cost to industry, employee, and public, the improvement of welfare plans, and the growth of a "new profession in industry, that of employment management" (the repository of policies on hiring, firing, welfare, job analysis, job evaluation, merit rating, and so on). Moreover, the Report did discuss the establishment, by the National War Labor Board of World War I, of "three rights of labor: The right to organize and bargain collectively; the right to a limited number of hours of labor; the right to a living wage," and the recognition of the rights—as well as such goals as an 8-hour day, a 48-hour week, abolition of child labor, and equal remuneration for equal work without discrimination as to sex—by the Versailles Treaty. Again, the noncommodity aspects of labor, recognized by the Versailles Treaty, had already been asserted in our own Clayton Act (1912). However, some of the other matters were ones that were slowly being recognized by state legislatures here. As a matter of fact, much of the legislation was to come after the establishment of the NRA Codes.

During the 1930–1931 Winter, President Hoover proposed to Wallace, Secretary of the American Engineering Council—an outgrowth of the Engineering Council of the National Technical Societies of America and the forerunner of the present Engineers Jount Council—that an investigation be made of the problems

of business depressions, their causes, and how they can be avoided. The American Engineering Council [30] had already authored three major reports—"Waste in Industry" (1921), "The Twelve Hour Shift in Industry" (1922), "Safety and Production" (1928)—and had co-operated with the National Bureau of Economic Research in preparing the monumental two-volume study, "Recent Economic Changes" (1929). The result was "The Balancing of Economic Forces." Supplementing its own contributions, ASME appointed a Committee on Capital Goods Industries to study the durable goods industry and engineering employment. Here, among other matters, the NRA Codes were treated. So important were the managerial aspects of the Codes as expressions of self-government that they were the subject of a paper by Alford [37] in 1935. Interestingly enough, such codes were not new nor were they originally sought by the government. Except for the war period, the government was not willing to enter into "such regulation." But, with the events of 1929, business associations sought a modification of the antitrust acts so that the respective trade associations could check price cutting and other "unfair" practices and curtail production to prevent oversupply. As a matter of fact, the last Congress under the Hoover Administration had under consideration the Black-Connery Bill advocating a 30-hour week for businesses engaged in interstate commerce. Many of these notions were assembled under Franklin Roosevelt's 1933 Industrial Recovery Act "to put the people back to work." This Act's famous Section 7a (with "the first legislative protection for collective bargaining" [38]) and the Wagner Act and the succeeding legislation have done much to create a "new" branch of law—labor law—which now command's management's attention as completely as does corporation law. Moreover, the rise of the unions—particularly the CIO, its affiliation with AFL, and other union activities—have created other problems for management's consideration.

Finally, no discussion of industrial relations can overlook the work of Mayo [39], an Australian teacher of logic, ethics, and philosophy who came to America and entered industrial research some three years after the 1919 Report. For, to him and his associates, Roethlisberger and Dickinson [40] and Whitehead [41], to name but three, goes the credit for one of the great experiments of all time—the Hawthorne Experiment at Western Electric. Here a great wealth of information was unearthed about industrial workers—the potency of worker participation and team membership as a motivating force, important as it is, was but one of the findings.

Gilbreth, the Human Sciences, and the Worker

In any treatment of management, in general, and the human element, in particular, the Gilbreth [42] work cannot be overlooked. As early as 1898, Gilbreth was disturbed when one of Taylor's "disciples" started to "time" men on one of the Gilbreth construction jobs without consideration of the "One Best Way." Although Taylor, as early as 1910, in a talk before the Birmingham Meeting of The Institution of Mechanical Engineers, was using the Gilbreth bricklaying work as an example of what could be accomplished, the field of motion study was too often considered a part of time study. It was the Gilbreth accomplishments that eventually set the subject in its rightful place. The unique contribution of the Gilbreth work involved "the One Best Way" for doing work—with wasteful and unproductive motions removed. Yet this was only a small part of the Gilbreth contributions.

In discussing the 1912 Report, Gilbreth felt that the term "labor-saving management" was not really descriptive of all that the new movement could accomplish. Hence, he favored the term "measured functional management." Very properly he [43] insisted, in a later paper, in 1922, that, if there is to be "science," there must be measurement, and, for measurement, management must have measuring units, measuring methods, and measurement devices. Although ethics, and not science, can furnish "standards of right and wrong," science *can* measure and compare actual to standard. Management has such standards—"such as the One Best Way to learn, to do, or teach any kind of work." Of course, a major part of the organization task requires one to plan, to gather, to arrange, to systematize all necessary information and data, and management devices are available for these purposes.

Of course, motivation is necessary to lead an organization to highest success and highest returns. In this connection, a management method is "ethical" if it offers a "square deal" to those concerned. Thus, the spying "stop-watch book" was to be condemned, because it infringes on human rights. And, although the science of management cannot determine right and wrong standards, it can determine efficient standards; e.g., the One Best Way. The standard must "conserve the best of the past," it must "organize the present," and it must "plan for the future." The science of management can benefit greatly from co-operation with other fields—safety engineering, "vocational guidance," teaching, physics and chemistry, economics and statistics, psychology, psychiatry, and physiology, and all of the other "human sciences."

The Gilbreth micromotion and chronocyclegraphic studies indicated that office work was also governed by the One Best Way, as far as analysis, planning, routing, motion study, fatigue study, waste elimination, standardization, and control were concerned. He put special emphasis on fatigue study as the first step in motion study. Of course, skill study and time study are also necessary in order to find the One Best Way. Thus, Gilbreth felt that Taylor made an important contribution by timing a job—for this was indeed different from merely prophesying how long a job should take—but, from the beginning, he condemned the secret time studies which Taylor, himself, later repudiated. He insisted that "motion study antedates time study," but more important " 'How long it takes to do work' is not so important as 'How to do it in the One Best Way.' "

The "therbligs," micromotion study, cyclegraphic and chronocyclegraphic analyses, the process charts, the route models, the "three-position plan of promotion" (forerunner of today's systematic management development), the fatigue studies, the improvement of tools in the shop and equipment in the office, the work with the handicapped, the spreading of management know-how and know-why throughout the world—which of these important contributions can be identified as the *one* great Gilbreth accomplishment? As great as these studies are and as great as their import has been, the fundamental and basic Gilbreth work lies in the development of management as a science focused directly on the human being.

In more recent years, the study of what had come to be known as "human engineering," has taken on an even wider field with the connotation of "human factors." In line with Gilbreth's assertion at Milan [43] in 1922, the engineer must now take on wider studies in many diverse fields—electrical engineering, mechanical engineering, industrial engineering, mathematics, statistics, psychology, physiology, anthropology. It includes systems engineering (including game theory, information theory, operations research, servomechanisms, and control), electronic data-processing, display, and control relationships (operator comfort, safety, audiometry accoustics, instrument design, and applied sensation and perception), physiology and environmental psychology (human organisms under stress, strain, heat, noise, radiation), systems analysis (group dynamic organization, decision theory), human variability (anthropological and anthropometric studies in human limitations, personnel selection, and so on).

Eventually, the work of such men as Brouha [44] in the physiological evaluation of human effort will become more widespread. The use of heart rate as work measure and heart recovery as a fatigue evaluation will become more common and the measurement of oxygen consumption more commonplace. However, according to Barnes [45] "the stop watch is the most commonly used method of measuring work in industry today." He lists at least nine "systems of motion-time data," and, at least three of the more widely used of these systems come within the time period allotted to this historical summary—the Motion-Time Analysis of Segur, the Work Factor System of Quick, Shea, and Kohler, and the Methods-Time Measurement [46] of Maynard, Stegemerten, and Schwab.

Alford, Management Principles, and Management Philosophy

The 1912 Report, with its notion of the basic principle of transfer of skill, attempted to bring into focus the principles and philosophy of management. Since the early practitioners were such enthusiastic adherents of systematic procedure, it was only natural that they began to inquire as to whether management itself had a system. It was natural, too, that many of their individual experiences formed the basis which led to generalizations. And so the early literature contains many papers in which are listed individual *principles, axioms, fundamentals*, e.g., Taylor [15] had four (see above), Emerson [47] listed twelve, Towne [48] gave twenty-three. And concomitant with these notions there was a continuing questioning as to whether management was *art or science*. Thus, Church and Alford [20], as noted in the foregoing, gave their own three regulative principles which, they felt, represented a more systematic attempt to search for the basis of the management art. They also asserted that the search for principles was a necessary one if management was to attain the "dignity of a science."

It was soon after writing the 1919 Report that the problem of principle codification confronted Alford. It began with his feeling that management—especially since engineers played so important a role—might be ready for a handbook. Like the ASME "Ten Year Reports," whose preparation, during his life, was a single-handed feat for him, he also felt the need for handbooks [35] at ten-year intervals. More specifically, he began his codification in the 1920's, first in an ASME paper and then in a book [49]. Influenced later by Urwick's thinking, Alford began to differentiate between *law* ("statement of fact") and *principle* ("guide to action"), and his "1934 Handbook" [35] and as his posthumous "1944 Handbook" [35] list *principles* of specialization, standardization, leadership, organization, production planning, materials control and handling, quality control and inspection, individual productivity, wage payment, and so on.

Incidentally, Fayol's work, especially that relating to the principles and elements of management, unfortunately reached the United States slowly. An English translation of a 1923 paper [51] he delivered at the Second International Congress of Administrative Science in Brussels appeared in 1937 in a collection of papers. And, although a limited edition of an English translation of his 1916 "Administration Industrielle et Générale" [6] appeared abroad in 1929, this book did not have wide circulation until the second translation appeared in 1949. However, Fayol was not entirely unknown here, for Alford included many of his concepts in the "1934 Handbook."

Nevertheless, there were many others who explored the field of principles and philosophy. Thus, in the United States, for example, Mary Parker Follett [52], deserves special mention for her keen application of psychological and sociological concepts to industry, in general, and to organizational groups and its members, in particular. Her profound ideas on leadership, constructive conflict, power, psychology of control, responsibility, consent and participation, conciliation and arbitration certainly entitle her to a high place in the "profession of management."

Among the names of other leaders in this aspect of management here and in England, there are Robb [53], Sheldon [8], Urwick [54], Brown [55], Barnard [56], Graicunas [57], Dennison [58], Mooney and Riley [59]. Finally, in even this brief treatment, it is not amiss to point out the contributions of at least two U. S. A. presidents in the field of public administration—one, a political scientist (Wilson [60]), and the other, an engineer (Hoover).

Planning and Control

The formal definition of management adopted by ASME in 1921 (see above) was often abbreviated into the simple "art of getting work done" [61]. This was essentially the objective of the men and women who practiced management. Inventory control, budgetary control, production planning and control, quality control, cost control—these were among the methods they developed with the intent of accomplishing the job (whether it was shoveling, moving pig iron, making shoes, or motivating workers). Fayol, in the very beginnnig of his classic work [6], insisted that industrial undertakings consisted of six main activities; i.e., technical (production, manufacture, and so on), commercial (buying, selling, and so forth), financial (optimum use of capital), security (protection of people and property), accounting (stocktaking, costs, balance sheets, and so on), and managerial. The last subgroup consisted of such activities as forecasting and planning, organization, command, co-ordination, and control.

It is difficult to insist that any single one of the managerial activities is of greater importance than any other, but control might be considered as one which is quite inclusive. For, as Fayol maintained, in the close of his first chapter:

"To control means seeing that everything occurs in conformity with established rule and expressed command."

Seemingly, then, *control* implies the existence of a plan, the organization to carry matters out, the necessary command, as well as the needed co-ordination. Thus, if we take *control* to mean a comparison of actual to plan (or standard), we can briefly bring together some of the more potent mechanisms of the management field.

What really is production control? Is it not the comparison of the bogey to the actual? As for the Gantt chart [22], does it not compare, on a time basis, actual performance to plan? Quality control? Is it not a comparison of actual product to specifications? And is not Shewhart's [62] Control Chart merely a device that tells one, before it is too late, whether the actual performance is proceeding according to plan?

Historical costing gave much helpful information on costs after they were incurred. But what was it that Emerson's "two column system" (later highly refined into standard costing as we now know it by Harrison [63]) did? The newer predetermined cost systems are cost-control mechanisms that do everything the older systems did—plus keeping everyone informed if, when, how, and why standard costs are or are not being met. In the sales field, there is control achieved by the "quota." And throughout the enterprise, there is the budget (advocated in the management field by such writers as Sinclair [64], McKinsey [65], and the variable budget advocate, Williams [66].) Finally, mention must be made of the break-even chart. Two of its most famous advocates were Knoeppel [67] (who used it as early as 1909) and Rautenstrauch [68].

These, then, are some of the devices that management has taken on to perform the important control function. In more recent years, another development has taken place, viz., the establishment of a control section in an organization to aid in the controlling process.

And What About Measurement?

The very existence of a standard implies a "yardstick," and a comparison of actual to standard implies a means of measuring discrepancies—as well as explaining why they occurred and the providing of a means to make the necessary corrections. Management, consequently, has for a long time been engaged in this search for a standard and for a measuring device. Thus, Taylor [15], borrowing units from the physical sciences, at first hoped to determine "what fraction of a horsepower a man was able to exert, that is, how many foot-pounds of work a man could do in a day."

Although Taylor could not find the precise answer to this question and although, for many years, many contributions were made to the *art* of management, there remained a continuing and growing emphasis on the quantitative aspects of the field. This was especially true for some of the individual problems with which managers were confronted. Thus, on the basis of a law evolved by Lord Kelvin (the economical size of a conductor is that for which the annual investment charges are equal to the annual cost of lost energy), several "minimum-cost" formulas [69] were obtained: Economic lot size for production (Raymond), minimum cost of quantity to be purchased (Davis), labor-saving equipment economies (Shepherd and Hagemann). These were all developed under ASME auspices. Another ASME contribution—but this time in conjunction with other engineering societies—was the device known as "preferred numbers." This was an attempt at securing economies through the use of a planned series for sizes, ratings, and so on. Although a good deal of the early work was done in France and Germany, it was discussed quite early at ASME and finally adopted in 1927 by the American Engineering Standards Committee (forerunner of today's American Standards Association) [30].

In addition, the work of some of the other engineering societies cannot be overlooked—particularly that of the civil engineers on depreciation and the mining engineers on depletion problems. The ASCE, almost half a century ago, issued a report on the valuation of railroad and public utility properties [70].

Although there were many instances of the use of quantitative methods for treating many management problems, there still was continued agitation for a more extensive use of mathematical methods for more of management's problems, particularly in the more fundamental and basic aspects of the field. One of the most ambitious of these attempts concerned the evaluation of manufacturing performance. These were the famous kilo man-hour (kmh) studies of Alford and Hannum, which were treated in a series of papers, the first of which was presented at ASME in 1929 [71].

Frankly, however, the use of mathematical methods in treating the *entire* organization was not too extensive. Many had insisted—and some still insist—that management problems are not capable of the same precise solutions as were the problems in the physical sciences. Nevertheless, in more recent years (particularly during World War II)—with the development of statistical methods and a fuller realization of some of the accomplishments of the mathematical, physical, and behavioral sciences—quantitative methods, *especially those* grouped under the title "operations research," have come to the forefront. The name probably arose by virtue of the fact that the scientists involved, e.g., among many others, Roberts, Williams, Blackett, and Zuckerman in England, and Morse, Johnson, Michels, and Von Neumann in the United States, were concerned principally with military problems of strategy, tactics, and other operational matters. Except for some more or less isolated cases (e.g., Levinson's [72] study of mail-order house returns and department store evening openings), most of the applications to nonmilitary problems came after the 1940's (hence, beyond the scope of this historical summary). Nevertheless, it is proper to note that the field is presently described by means of definitions ranging from an emphasis on its use of scientific method through its outlook in making decisions objectively [73].

Some of OR's characteristics are of particular interest: The emphasis of research on the *whole* organization, the involvement with the optimization of operations from both the long and short-range viewpoint, the extension of techniques already in use in management, the development of models, the design and study of simulated operations, the use of a team of experts from many fields, and, of course, the utilization of the most recent mathematical techniques.

Certainly OR is an invigorating and stimulating approach. Certainly it is attuned to the complicated times in which we live. Yet, only Minerva sprang full-born from Jupiter's brain. Most ideas have roots stretching back to the past, and OR is no exception. As a matter of fact, by its very admission of its purposive extension of management methods, some of its beginnings can be found in management history.

Thus, consider, for example, one of the papers delivered in London at the 1935 International Management Congress. Its author was Harry Hopf [74], a man whose contributions to management were many—from international activities through organization problems—but whose name is probably most often linked, along with that of Leffingwell, to the application of scientific management to *the office*.

In this paper, he developed the thesis that "the time is ripe for transformation of the science of management into a new and more inclusive science—optimology, the science of the optimum." For him, the *optimum* was "that state of development of a business enterprise which tends to perpetuate an equilibrium among the factors of size, cost, and human capacity and thus to promote in the highest degree regular realization of the business objectives." In this connection, he had measured results and capacities in almost a dozen insurance companies, and he had hoped that similar work would be done in other enterprises. Certainly, in this work, which remained unfinished at the time of his death, we can find some points of resemblance with at least one of the aspects of today's OR.

Consider the "model." OR would never lay claim to any originality in this matter, for it borrowed the concept from the mathematical and physical sciences where it had been used by Galileo, Kepler, Newton, and a host of others. But what of the use of the model by "older" management methods? Is not, for example, the familiar economic lot-size formula (see above) a model? Does it not express and choose, from the very many parameters, those which are strategic and quantifiable, and does it not so relate them mathematically that there can be obtained a finite, objective, and decisive answer which is in keeping with the optimum sought? (Frankly, this is only one of the many more instances utilized by management employing engineering economics and industrial engineering methods.) As a matter of fact, if the reader would prefer, in this connection, some OR overtones which are more theoretical, Barnard's [56] definition of "limiting and complementary" factors will be of great interest.

And what of the team approach? Surely, from the very beginning, whenever that was, the need for calling on the other disciplines was evident. This was natural, because (*a*) most people entered the management field on account of it being a necessary adjunct to what was originally their main pursuit, and their original training became an integral part of their thinking, and (*b*) the management field was very early recognized as being sufficiently complex and made up of many facets.

Such pioneers as Taylor (who gave up Harvard for an apprenticeship in a small machine shop), Gilbreth (who decided to forego M.I.T. for work in the construction business), Gantt (who

taught natural science before he worked as a draftsman and studied at Stevens), and Emerson (who taught modern languages at Nebraska before his railroad activities) found, in management, a necessary part of their missions. Even the most casual perusal of Urwick's [75] "The Golden Book" will yield names of persons whose contributions were not limited to the management field. Thus, to mention but a few, there are a member of the U. S. Supreme Court (Brandeis), two tire manufacturers (Michelin Brothers), a psychiatrist (Sollier), a couple of psychologists (Munsterberg and Myers), a couple of chemists and metallurgists (Le Chatelier and Solvay), a social worker (Follett). Frankly, would it have been possible for any of these, in their work in the management field, not to have been mindful of the needs and methods of the other fields?

Moreover, could it have been possible for any worker in the management field to face problems here without being aware of the overtones of the mathematical, physical, social, and biological sciences? The management theorist and practitioner alike still marvel at the remarkable mechanism and the wonderful organism that is the human body. Certainly here is an ideal to which all organizations might strive.

Finally, the need for the team approach was clearly indicated by Gilbreth [43] at Milan more than a third of a century ago. Under the heading, "Cooperation Stimulates Progress," he said:

"More than this, the engineer has welcomed investigators and thinkers in other lines into the field of management.

"... The engineer has gladly cooperated with the chemist, the physicist, and with all other scientists whose work leads them into the field of materials. Increasingly, also the engineer is cooperating with, and inviting into management, the educator, the physiologist, the psychologist, the psychiatrist, and other scientists engaged in what are known as the human sciences—also the economist and the statistician."

Today's co-ordinated multidiscipline approach of OR may well be considered an answer to the Gilbreth invitation. In addition, OR, itself, has borrowed heavily from the mathematician and logician in using such tools as linear (and nonlinear) programming, symbolic logic, value theory, matrix algebra, stochastic processes, game, information, and search theories, and so on, in minimizing cost, in market research, in selecting distribution centers, in locating customers, in determining optimum inventory, and in the myriad of other management problems.

Yet, in spite of all these "newer" applications and developments, OR owes much to those who already made history in management and other fields.

Promulgating Management Here and Abroad

Norbert Wiener [76] is quite insistent in his belief that "language is perhaps the most distinctive feature of men as compared with the lower animals." Frankly, science's development is greatly dependent upon a free exchange of ideas, and management, itself, puts high priority on communication. Little wonder, then, that management information has been spread so widely—despite the early (and sometimes present) attempts at secrecy. Just as there were, in the United States, for example, notable exceptions to the early secrecy (like Taylor's conferences at Chesnut Hill, the meetings in the Gilbreth homes in Providence and Montclair, the Hopf Institute of Management at Ossining, the work at the colleges, Kimball at Cornell, Diemer at Penn State, Roe at NYU, the 1911 Conference at Dartmouth, the work of the societies, like ASME, Society of Industrial Engineers, and the Taylor Society, the magazines, like *American Machinist*, *Industrial Management*, and *Manufacturing Industries*), so, too, one will find a few exceptions today from the more frequent free and open discussions.

In any event, although management exerted a tremendous impact here, the United States held no monopoly. England, the countries on the European continent, as well as those in this hemisphere were no strangers to management principles and practice. In addition to people like Wallace and Pearl Clark [77] who did work abroad, there were people like Mayo, the Australian who made important contributions here. Furthermore, management ideas did not stop at the water's edge, for many Americans delivered papers abroad and many persons from other countries delivered papers here. Even the Stkhanovism of the USSR can be related to early scientific management attempts here; moreover, the Gantt chart has, for many years, been used by the Russians.

Probably 1924 may be set as the date marking a free interchange of management ideas throughout the world, for that was the date of the First International Management Congress in Prague. Its program covered the application of management to all areas of activity—including education—and stimulated the authors of future ASME papers and reports to widen their scope.

Management's Challenge to the Engineer

It is, as history is our witness, extremely difficult to divorce the action of the engineer from the development of management. Urwick expressed it very concisely in the title of his paper—which was the Calvin Rice (after ASME's great secretary) Lecture at the Western Hemisphere Congress—"Management's Debt to Engineers" [78]. And, of all the contributions by engineers, none can, to date, approach the number, magnitude, and quality of those that came from the ASME.

The engineer cannot afford to consider these contributions to be a thing of the past, for management is a matter that is still deserving of his earnest and sincere attention. It needs his technical training, his logical approach, his practical attitude now more than ever before, for we are now living in an even more highly complicated technical society. Many years ago, Thorstein Veblen [79], America's iconoclast economist, paid homage to the engineer. Although some may still refuse to travel the full length with him, the fundamental truth of at least some of his observations is as correct today as it was half a century ago:

"These expert men, technologists, engineers, or whatever name best suits them, make up the indispensable general staff of the industrial system; and without their immediate and unremitting guidance and correction the industrial system will not work. It is a mechanically organized structure of technical processes designed, installed, and conducted by these production engineers. Without them and their constant attention, the mechanical appliances of industry will foot up to just so much junk. The material welfare of the community is unreservedly bound up with the due working of this system, and therefore with its unreserved control by the engineers, who alone are competent to manage it."

The growth of automation, the increased reliance on electronic data-processing equipment, its language, and the interpretations of the computations it makes—these are matters which the engineer is uniquely able to understand quickly and effectively. Of course, these are matters that will require the services of engineers of growing stature. Surely, the growth of engineering is in itself a challenge—but the meeting of the demands of industry and society is even a greater challenge. The engineer cannot allow himself—nor can society afford to allow him—to be overtaken by nonengineers in meeting this challenge.

After all, Wiener's [76] admonition about the "inhuman" use of human beings. "... any use of a human being in which less is demanded of him, and less attributed to him than his full status is a degradation and a waste ..." is as applicable to the engineer as to those who operate the machines he designs. The

engineer must work to his fullest capacity for all of society. He must, like Gantt, "be among you as he that serveth," and live up to his responsibility to utilize the resources of nature and of human nature for the benefit of mankind.

References and Notes

The following listing, which comprises many of the references used in preparing this section, may be assumed as a fair (but certainly not complete) selection of management literature. However, in many of the books to which reference is made, excellent bibliographical lists may be found. Furthermore, the reader must remember, this section is mainly concerned with management history before 1950.

1 C. Babbage, "The Economy of Machinery and Manufacture," Charles Knight, London, 1832. (Chapter 18, "On the Division of Labor" is reprinted in "Classics in Management," H. F. Merrill, editor, New York, AMA, 1960, pp. 29–44.)

2 O. Sheldon, "The Development of Scientific Management in England," *Harvard Business Review*, III, Jan. 1925, p. 129.

3 F. W. Taylor, "Testimony Before the Special House Committee," *Scientific Management*, Harper, 1947, pp. 5–6, 282–5. For complete testimony, see *Hearings*, House of Representatives Special Committee to Investigate the Taylor and Other Systems of Shop Management, Under Authority of HR 90, 62nd Congress, 2nd session, three volumes, Washington U. S. Printing Office, 1912.

4 O. Sheldon, "What Is Rationalization?" *Industrial Welfare*, London, March, 1929, p. 85.

5 H. S. Person, "The Origin and Nature of Scientific Management," *Scientific Management in American Industry*, Taylor Society, Harper, 1929, pp. 1, 5, 6, 8–9.

6 H. Fayol, "Administration Industrielle et Générale: Prévoyance, Organisation, Commandment, Coordination, Controle," originally published in *Bulletin de la Société de l'Industrie Minérale*, 1916. Published in book form in Paris, by Dunod, 1925. First English translation, "General and Industrial Administration," by J. A. Conbrough, Geneva, International Management Institute, 1929. Second English translation, "General and Industrial Management," by C. Storrs, Pitman, London, 1949.

7 L. Urwick, "Foreword to Storrs' Translation of Fayol's General and Industrial Management," pp. V, XII–XVII.

8 O. Sheldon, "The Philosophy of Management," Pitman, London, 1923.

9 J. W. Schulze, Some Definitions. In *Bulletin of the Taylor Society*, IV, June, 1919, p. 22. (See also "Administration: The Art and Science of Management," A. Lepawsky, editor, Knopf, New York, N. Y., 1949; also, the "Science of Production Organization," by E. H. Anderson and G. T. Schwenning, Wiley, New York, N. Y., 1938.

10 R. H. Thurston, President's Inaugural Address, TRANS. ASME, vol. 1, 1880, p. 3.

11 H. R. Towne, "The Engineer as Economist," TRANS. ASME, vol. 7, 1886, pp. 428–432 (reprinted in *Classics in Management*, pp. 59–64.)

12 F. B. Copley, "Frederick W. Taylor: Father of Scientific Management," two volumes, Harper, New York, N. Y., 1923.

13 F. W. Taylor, "A Piece Rate System," TRANS. ASME, vol. 16, 1895, pp. 856–903.

14 F. W. Taylor, "Shop Management," TRANS. ASME, vol. 24, 1903, pp. 1337–1456 (reprinted in *Scientific Management*, Harper, 1947).

15 F. W. Taylor, "Principles of Scientific Management," special edition, confidential circulation, Harper, 1911 (reprinted in *Scientific Management*, Harper, 1947).

16 L. Urwick, "The Integrity of Frederick Winslow Taylor," *Advanced Management*, vol. 23, No. 3, March, 1958, pp. 9–16.

17 M. J. Nawordny, "Scientific Management and the Unions," Harvard University Press, Cambridge, Mass., 1955.

18 R. F. Hoxie, "Scientific Management and Labor," Appleton, New York, N. Y., 1915.

19 Dartmouth College Conference, Addresses and Discussions at the Conference on Scientific Management, held October 12–14, 1911. Hanover, Tuck School, Dartmouth College, 1912.

20 A. H. Church and L. P. Alford, "The Principles of Management," *American Machinist*, vol. 36, no. 22, May 30, 1912, pp. 857–861 (reprinted in *Classics in Management*, pp. 197–214). Much of this was expanded into a book—"The Science and Practice of Management," by Church, Engineering Magazine Company, New York, N. Y., 1912.

21 D. B. Porter, "Controlling the Manufacture of Parts on Order and for Stock," TRANS. ASME, vol. 51, 1921, MAN—51-11, pp. 105–109.

22 W. Clark, "Gantt Chart," Ronald Press, New York, N. Y., 1922.

23 H. L. Gantt, "A Bonus System of Rewarding Labor," TRANS. ASME, vol. 23, 1901, pp. 341–360 (reprinted in *Classics in Management*, pp. 117–135).

24 H. L. Gantt, "Industrial Leadership," Yale University Press, New Haven, Conn., 1916.

25 H. L. Gantt, "Training Workmen in Habits of Industry and Cooperation," TRANS. ASME, vol. 30, 1908, pp. 1037–1048 (reprinted in *Classics in Management*, pp. 136–150).

26 H. L. Gantt, "Work, Wages and Profits," second edition. Engineering Magazine Co., 1913, pp. 111–112, 8, 54–55, 231-2.

27 H. L. Gantt, "Organizing for Work," Harcourt, Brace and Howe, New York, N. Y., 1919, pp. 5–7, 14–15, 108. (Chapter I, "The Parting of the Ways" is reprinted in *Classics in Management*, pp. 151–158.)

28 L. P. Alford, "Henry Laurence Gantt: Leader in Industry," ASME Publication (also—Harper) 1934.

29 C. B. Thompson, "The Literature of Scientific Management," in *Scientific Management:* "A Collection of the More Significant Articles Describing the Taylor System," Harvard University Press, Cambridge, Mass. 1914, p. 24.

30 W. J. Jaffe, "L. P. Alford and the Evolution of Modern Industrial Management," NYU Press, New York, N. Y., 1957, pp. 36, 201–218, 124–133.

31 C. W. Lytle, "Wage Incentive Methods," revised edition, Ronald Press, 1942, pp. 55, 105ff.

32 H. R. Towne, "Gainsharing," TRANS. ASME, vol. 11, 1889, pp. 600–626.

33 F. A. Halsey, "The Premium Plan for Paying Labor," 1891, pp. 755–761.

34 J. Rowan, "Premium Plan at the Works of D. Rowan & Co.," *American Machinist*, vol. 25, pp. 49, 53; also another article on similar subject in *American Machinist*, vol. 26, p. 1383.

35 L. P. Alford, Handbooks published by Ronald Press: "Management's Handbook" (1924); "Cost and Production Handbook" (1934); "Production Handbook" (1944—posthumously with Bangs). Since 1944, at least three other handbooks have appeared: "Handbook of Industrial Engineering and Management" (ed. by Ireson and Grant), Prentice-Hall, New York, N. Y., 1955; "Industrial Engineering Handbook" (ed. by Maynard), McGraw-Hill, New York, N. Y., 1956; Production Handbook (ed. by Carson), Ronald Press, 1958.

36 J. M. Juran, "Transition in Corporate Controls," *Advanced Management*, vol. 13, no. 3, Sept., 1948, pp. 126–130.

37 L. P. Alford, "Management Aspects of American Codes of Fair Practice," International Congress for Scientific Management, London, 1935.

38 F. Peterson, "Survey of Labor Economics," Harper, 1947, p. 602.

39 E. Mayo, "Hawthorne and the Western Electric Company" (reprinted from Mayo's "The Social Problems of an Industrial Civilization," Harvard, 1945, chap. 4, in *Classics in Management*, pp. 417–436.)

40 F. J. Roethlisberger and W. J. Dickinson, "Management and the Worker," Harvard University Press, 1939 (see also Roethlisberger's "Management and Morale," Harvard, 1941).

41 T. N. Whitehead, "The Industrial Worker," two volumes, Harvard University Press, 1938.

42 F. B. Gilbreth, "Concrete System," *Engineering News*, New York, N. Y., 1908; "Field System," Clark, Chicago, 1908; "Bricklaying System," Clark, 1909; "Motion Study," Van Nostrand, New York, N. Y., 1911; "Primer of Scientific Management," Van Nostrand, 1912.

F. B. and L. M. Gilbreth, "Fatigue Study," Sturgis & Walton, New York, N. Y., 1916; "Applied Motion Study," Sturgis & Walton, 1917; "Motion Study for the Handicapped," Macmillan, New York, N. Y., 1920.

L. M. Gilbreth, "The Psychology of Management," Sturgis & Walton, 1914; "The Quest of the One Best Way," Society of Women Engineers, Bridgeport, Conn., 1925.

L. M. Gilbreth and A. R. Cook, "The Foreman in Manpower Management," McGraw-Hill, 1947.

L. M. Gilbreth, O. M. Thomas, and E. Olymes, "Management in the Home," Dodd, Mead, New York, N. Y., 1954.

W. R. Spriegel and C. E. Myers (editors), "The Writings of the Gilbreths," Homewood, Irwin, 1953.

Edna Yost, "Frank and Lillian Gilbreth: Partners for Life," Rutgers University Press, New Brunswick, N. J., 1949.

43 F. B. Gilbreth, "Science in Management for the One Best Way to Do Work," Societa Umanitaria, Milan, Italy, 1923.

44 L. Brouha, "Physiological Evaluation of Human Effort in Industry," Paper 57—A-55 delivered at ASME Meeting, Dec., 1957.
45 R. M. Barnes, "Motion and Time Study," fourth edition, Wiley, 1958.
46 H. B. Maynard, G. J. Stegemerten, and J. L. Schwab, "Methods—Time Measurement," McGraw-Hill, 1948.
47 H. Emerson, "The Twelve Principles of Efficiency," Engineers Magazine Co., New York, N. Y., 1912 (chapter 3 reprinted in *Classics in Management*, pp. 179–194).
48 H. R. Towne, "Axioms Concerning Manufacturing Costs," TRANS. ASME, vol. 34, 1912, pp. 1111–1129.
49 L. P. Alford, "Laws of Manufacturing Management," TRANS. ASME, vol. 48. 1926, pp. 393–418; see also "Alford's Laws of Management Applied to Manufacturing," Ronald Press. 1928.
50 L. Urwick, "The Principle of Direction and Control," *Dictionary of Industrial Administration* (John Lee), Pitman, London, 1928, p. 117.
51 H. Fayol, "The Administrative Theory in the State" (translated by S. Greer), "Papers on the Science of Administration" (L. Gulick and L. Urwick, editors), Columbia University Press, 1937.
52 M. P. Follett (Collected Papers) "Dynamic Administration" (H. C. Metcalf and L. Urwick, editors), Harper, 1941.
53 R. Robb, "Lectures on Organization," privately printed 1910. (Chapter 1 reprinted in *Classics in Management*, pp. 161–175.)
54 L. Urwick, "The Elements of Administration," Harper, 1943.
55 A. Brown, "Organization of Industry," Prentice-Hall, 1947.
56 C. S. Barnard, "The Functions of the Executive," Harvard University Press, 1938.
57 V. A. Graicunas, "Relationship in Organization," "Papers on the Science of Organization," pp. 181–187.
58 H. S. Dennison, "Management," *Recent Economic Changes*, McGraw-Hill, 1929, vol. 2, pp. 495–546.
59 J. D. Mooney and A. C. Riley, "Onward Industry," Harper, 1931 (later modified and appeared as the "Principles of Organizations" first by both authors and then by Mooney alone).
60 Woodrow Wilson, "Congressional Government," Houghton-Mifflin, Boston, Mass., 1885; see also "The Study of Administration," *Political Science Quarterly*, vol. 2, June, 1887, pp. 197–222.
61 L. P. Alford, "Scientific Industrial Management," World Engineering Congress, Tokyo, 1929.
62 W. A. Shewhart, "Economic Control of Manufactured Product," Van Nostrand, 1931.
63 G. C. Harrison, "Cost and Profit Variation Formulas," *Management's Handbook*, pp. 1381–1399.
64 P. Sinclair, "Budgeting," Ronald Press.
65 J. O. McKinsey, "Budgetary Control," Ronald Press, 1922.
66 J. H. Williams, "The Flexible Budget," McGraw-Hill, 1934.
67 C. E. Knoeppel, "Graphic Production Control," Engineering Magazine Co., 1920.
68 W. Rautenstrauch, "The Successful Control of Profits," Forbes, New York, N. Y., 1930.
69 For the most convenient reference to these formulas, see Alford's book on "Laws" (note [49]).
70 Special Committee to Formulate Principles and Methods for the Valuation of RR Property and Other Public Utilities, Report. *Trans. ASCE*, vol. 81, 1917, Paper 1401.
71 L. P. Alford and J. E. Hannum, "A Basis for Evaluating Manufacturing Operation," TRANS. ASME, vol. 51, 1929, MAN—51-2, pp. 9–15.
72 H. C. Levinson, "Experiences in Commercial Operations Research," *Operations Research for Management* (J. F. McCloskey and F. N. Trefethen, editors), Johns Hopkins Press, Baltimore, Md., 1954, pp. 265–288.
73 W. Scott, "Australia and the Challenge of Change," Law Book Co. of Australasia, Sydney, Australia, 1957.
74 H. A. Hopf, "Management and the Optimum," privately printed (reprinted in *Classics in Management*, pp. 355–403).
75 L. Urwick, "The Golden Book of Management," Newman Neame, London, 1956.
76 N. Wiener, "Human Use of Human Beings," Houghton-Mifflin, Boston, Mass., 1950.
77 Pearl F. Clark, "The Challenge of the American Know-How," Harper, 1948.
78 L. Urwick, "Management's Debt to Engineers," *Advanced Management*, vol. 17, no. 12, Dec., 1952, pp. 5–12.
79 T. Veblen, "The Captains of Finance and the Engineers," from the "Engineers and the Price System," reprinted in "What Veblen Taught" (W. C. Mitchell, ed.), Viking, New York, N. Y., 1936.

DISCUSSION

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This paper is a most scholarly review of Scientific Management up to 1950. My brief discussion will be limited to that portion of it dealing with Henry L. Gantt. It was my very good fortune to have been associated with him during the last two and one half years of his life. These included the period of World War I, during which he developed his system of planning and control through charts, of which Wallace Clark in 1922 said: "The Gantt Chart is the most notable contribution to the art of management made in this generation."

Mr. Gantt recognized that these charts were more than tools to aid in production planning and control. They are in reality effective measures of performance of those at all levels from workman to manager. The record is clear and the responsibilities for either good or bad performance are accurately placed. This is truly a democratizing force which causes control to gravitate from weak to strong hands, or as he put it, "to those who know what to do and how to do it." This reflects the philosophy of Gantt who was impatient with any system which covered up the shortcomings of management and caused frustration and ill-will within the organization.

Gantt's philosophy can best be understood through his own words. The following are quotations from his writings. "We have no right morally to decide as a matter of opinion that which can be determined as a matter of fact." His charts were certainly an aid in implementing this. They were designed to present the facts developed in answer to three penetrating questions. The first was: Are all the machines running and if not Why not? For the answer to this the machine record or idleness chart told the story. The second was: If all the machines are running are they producing that which is needed? For this the progress chart gave the answer. The third was: If all the machines are running and producing what is wanted, are they producing the quantity that ought to be produced? Here the man record chart showed whether the operator was performing up to task or standard. It is noted here that attention to operator performance came last, only after management had put its own house in order by reducing machine idleness and by proper scheduling of work to be done.

"The Scientific Method thrives best when all have equal opportunity, and our chances of getting proper industrial leaders is far greater when we have a whole people to choose from than if they are to be selected from any one class," and "The nation which does not so develop its industries so as to produce men, will not for any great length of the time hold its place in the world."

Gantt was a proponent of the principle that idle capital was no more entitled to reward than idle labor. This was quite revolutionary at the time. On the subject of reward Gantt has the following to say. "Reward according to service rendered is the only foundation on which our industrial and business system can permanently stand. It is a violation of this principle which has made the occasion for socialism, communism, and Bolshevism. All we need to defeat these "isms" is to re-establish our industrial and business system firmly on the principle advocated by Abraham Lincoln in 1847, and we shall establish an economic democracy that is stronger than any autocracy." Lincoln wrote: "To secure to each laborer the whole product of his labor, or as nearly as possible, is a worthy object of any good government. But then the question arises, how can a government best effect this? Upon this the habits of our whole species fall into three

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great classes—useful labor, useless labor, and idleness. Of these, the first only is meritorious, and to it all the products of labor rightfully belong; but the two latter, while they exist, are heavy pensioners upon the first, robbing it of a large portion of its just rights. The only remedy for this is to, as far as possible, drive useless labor and idleness out of existence." How timely these remarks of Mr. Lincoln are today. Of useless labor I am thinking not only of the feather bedding in industry but also the useless labor in the office accountable to management.

Gantt continues on the above theme: "Moreover it conforms absolutely to the teachings of all the churches, for Christ, who was the first to understand the commanding power of service, thus stands revealed as the first great Economist, for economic democracy is simply applied Christianity. This was also clearly understood by the great leaders of the Church of the middle ages, whose failure to establish it as a general practice was largely due to the rise of an intellectualism which disdained practicality. Now, however, when a great catastrophe has shown us the error of our ways, and convinced us that the world is controlled by deeds rather than words, we see the road to Universal Peace only through the change of Christianity from a weekly intellectual diversion to a daily practical reality."

Authors' Closure

Professor Porter's discussion presents a very timely and appropriate tribute to the work and personality of one of the pioneers. 1961 is the hundredth anniversary of the birth of Henry L. Gantt. It is fitting that the ASME, of which he was a devoted member, and that the Management Division in particular, express appreciation of his contribution to Management.

His life shows clearly, not only the caliber of the pioneers, but their ideals, their beliefs, and their warmth of feeling for people everywhere.

If the contributions of the past help engineers of the future to evaluate, and inspire them to act constructively and wisely, they will have served their purpose.

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The Philosophy of Management[1]

American Belief in Progress

THE title of this report "Ten Years' Progress in Management" involves, in itself, a philosophical assumption; namely, that the mere lapse of time connotes progress. This is a peculiarly American assumption. It derives from two facts about the American people:

1 Over the past quarter of a millenium they have enjoyed the coincidence of an unexploited continent possessing great natural resources and the industrial revolution.

2 They derive in large measure from immigrants of European stocks self-selected as individuals of initiative who were prepared to sacrifice their customary ways of living for the sake of economic opportunity.

This combination of factors has resulted in a volume and speed of development in the material arts of living previously unparalleled by any community in human history. Very large numbers of Americans have made spectacular advances, from the penniless immigrant to the established citizen with money in the bank and a position in society. To quote from a recent book by an American sociologist, "notions of progress, it has often been noted, are usually congenial to those who are rising in the scale of income and position"[1].[2]

Development of Education for Management

In the United States there is a deep-seated national belief in the processes of formal education and in the duty of the community to provide for every citizen capable of benefiting from it opportunity to become an educated person. Harvard College, precursor of Harvard University, was founded in 1636, only 16 years after that first winter in which half the "pilgrims" from the *Mayflower* died. In the older societies from which the population was drawn, the differences between social categories were largely educational. There is an interest in business as a calling and a prestige accorded to leadership in business, as compared with other occupations, which are quite contrary to the established social attitudes of many older countries. At the beginning of this century, it was suggested that leadership skill in business was not a matter of heredity, ownership, individual experience, or accident, but that there was a body of knowledge bearing on the subject, called management, which could be taught and learned. A great popular demand developed for educational facilities in this subject. This did not, however, come from business itself. Established business leaders who had received no formal education or training in management skills were somewhat slow to accept the "mental revolution" [2] involved in this idea. It came from students and their parents; educational establishments did their best to meet it. A national educational apparatus in this new field of knowledge was developed with a speed and on a scale previously unprecedented in the history of education anywhere in the world. Whereas in 1898 there was one university in the United States with a faculty or department of business [3], there are today some 600 institutions offering first and/or second degrees [4], and between 400 and 600 junior colleges giving a 2-year full-time course in business subjects [5].

Managing is, however, a practical art. In the development of a new body of knowledge about a practical art it is of importance that theory and practice should be integrated closely. As Francis Bacon wrote more than 350 years ago: "Studies themselves doe give forth Directions too much at large unless they be bounded in by Experience"[6].

That sentence describes precisely the situation in which academic institutions teaching management in the United States found themselves throughout the first half of the present century. They were in the position of schools for research into and teaching of medicine, very little influenced by "clinical experience." This was not the fault of the personnel manning such institutions. As academic people they did their best to keep in contact with realities. It was the direct result of the indifference of American business as a whole to the problem of how its supply of future managers should be taken care of [7].

Concern for Executive Development in American Business

It was almost precisely ten years ago that this indifference began to evaporate among any substantial number of business corporations [8]. For the time being "executive development" became "the story of the hour" among a goodly proportion of the more progressive elements in American business [9]. And, while this initial enthusiasm was bound to level out into a more balanced policy, its results endure.

The growing recognition that deliberate provision for its own supply of future executives is not a charity or a fad, but a normal business responsibility to which the governing group in any business must attend or be guilty of gross dereliction of duty, that it is a responsibility to which it should devote not only time and effort but, if necessary, a substantial investment, was the most important concept in the philosophy of management to develop in the past decade. It is important for its direct effects on the attitude of managers to their work; it is still more important for its indirect effects on the development of education for management.

Direct Effects of Executive Development Seen as a Business Responsibility

In its effects on the attitude of managers it was bound to reduce the cynicism, self-seeking, and materialism which had hitherto played too conspicuous a part in American business philosophy.

If managing is defined as "getting things done through people," too much emphasis by superiors on "the things" is bound to provoke cynicism among "the people." Human beings called upon to collaborate for any purpose can only develop enthusiasm for the group effort if they can be convinced that in pursuing it they are also serving their individual aims. Growth is an aim about which, consciously or unconsciously, almost every person is concerned. By directing the attention of executives to the individual growth potential of their subordinates, a policy of executive development compels them to concern

[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

[2] Numbers in brackets designate References and Notes at end of paper.

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themselves with the individual while at the same time reconciling this concern with the broader purposes of the group.

Simultaneously it is a constant reminder to executives themselves that they serve an immortal corporation whose interests extend beyond their own "little day." An executive who is expected to concern himself constantly with the development of potential successors is being reminded as constantly that he has a responsibility for results which will occur outside the limited span of his personal participation.

Because it can only succeed if the superior concerns himself with the individual subordinate [10], an effective policy of executive development tends to correct the divorce between "managing the worker and managing work," which is at the root of much of the current dissatisfaction with specialized personnel management [11].

Indirect Effects of Executive Development on Education for Management

(a) On the Philosophy of Management. It is, however, on the philosophy of management that the concern with executive development among American businessmen is likely to have the most profound influence, because it must end by bridging the gap between academic study of the subject and its application to practical ends, which has hitherto been the most serious weakness in the evolution of thought about management in the United States. It is impossible for businessmen, once they are fully convinced of the need for executive development, to escape the logical conclusion that educational facilities and the subsequent training which they give to up-and-coming executives are not separate activities. They are parts in a single process, linked indissolubly by the fact that they are contributory to a single end result, an individual fitted to lead one of the great corporations characteristic of modern business.

Such a concern among businessmen with what the individual is taught and how he is developed *prior* to entering on a business career is bound to have the most far-reaching effects on business philosophy. It is impossible to decide what a young man should be taught in order to pursue a particular calling without first deciding what that calling involves. This means not only the content of knowledge, but the qualities of intellect and character, of outlook and insight, which the community will require of those to whom it will entrust high responsibilities.

(b) On Provision of Educational Facilities. In the decade under review business has been chiefly preoccupied in filling in the gaps in its own arrangements for continuing the process started in educational institutions. Attendance at short courses organized by such institutions as The American Management Association has risen meteorically. Some business corporations such as the General Electric Company have organized their own educational centers on a substantial scale. More, perhaps, have asked educational institutions to provide executive development programs. "In 1950 only four such programs were in existence: by 1958 there were over 40 with more being planned" [12].

These developments in themselves have brought businessmen and academic people more closely together in the study of problems. But signs are not lacking that the more fundamental process of inquiry contemplated in (*a*) is gathering headway. Toward the end of the period two of the great private foundations published substantial reports on education for management [13]. While these reports were academic in authorship and still inclined to treat the problem as one which is primarily the concern of educational institutions, they were frankly critical in many directions. The kind of unity between research and "clinical experience" which has long been characteristic of medicine cannot be far away. Its results will be far-reaching.

Direct Attack on the Problem of the Underlying Philosophy of Business

Apart from the influence of executive development as a basic *business* responsibility, there has been a great deal of new thought among businessmen themselves as to the philosophy which should underlie their activities. Early in the period, a book such as Wayne Leys' "Ethics for Policy Decisions" [14] attracted a wide circle of readers. This was followed by Peter Drucker's "The Practice of Management" [15]. In 1958 the *Harvard Business Review*, whose contents list is a valuable index as to the problems which are really preoccupying the minds of progressive business leaders in the United States, devoted no less than nine items, in its number, celebrating the fiftieth anniversary of the Harvard Business School, to the basic philosophy of business [16]. Since that date publishers' lists have been full of titles indicative of interest in the same broad approach [17].

Possibly Drucker may be selected as typical of the change in attitude which has occurred among the most progressive business thinkers. Within the limits of the author's experience "The Practice of Management" was unquestionably the best book on the subject which appeared in the United States during the decade [18]. More noteworthy was the fact that the challenge, which it threw down to the traditional precepts of *laissez-faire* economic philosophy, apparently passed unnoticed This may be because this challenge was stated incidentally; but it was nonetheless clear. Drucker said:

1 That the making of profit for individuals is *not* the purpose of business; the purpose of business as an institution is to supply consumers. "There is only one valid definition of business purpose: *to create a customer*" [19].

2 That in the course of the present century management has emerged as "an essential, a distinct, and a leading institution" in modern society [20], and that institutions of *social* importance cannot be based solely on individual acquisitiveness . . . "that Jim Smith is in business to make a profit concerns only him and the Recording Angel" [21]

3 That therefore the cornerstone of *laissez-faire* theory, the automatic and self-adjusting quality of competition cannot be made a justification for selfish or unsocial management action. Such action must be based on genuine consideration of what is in the public interest . . . "it is management's public responsibility to *make* whatever is genuinely in the public good *become* the enterprise's own self-interest" [22]. For "in a good, a moral, a lasting society the public good must always rest on private virtue" [23].

4 This conviction that managers have an ethical choice, a duty to reconcile their obligations to the stockholders who have appointed them with the wider interests of the community, underlays the point which occurs most frequently in his book, an emphasis on *integrity* as *the* quality most essential in a manager. "The best practices will fail to build the right spirit unless management bears witness for its own professional beliefs every time it appoints a man to a management job. The final proof of its sincerity and seriousness is uncompromising emphasis on integrity of character" [24]. He returns to this point some twenty times in the course of the book [25].

5 And his insistence on integrity was because he realized the vital importance of leadership. "The hostility to capitalism and capitalists is moral and ethical. Capitalism is being attacked not because it is inefficient or misgoverned but because it is cynical" [26]. And a manager "should be a realist; and no one is less realistic than the cynic" [27].

The Professionalization of Management

It may be asked how far this philosophy of Drucker's, which

has been indicated very briefly, corresponds with the actual thinking of those in positions of responsibility in American business. It could hardly be expected that so new and so revolutionary a change of emphasis would overcome immediately the accumulated impetus of *laissez-faire* individualist theory with more than a century of established acceptance behind it. On the other hand, the growing interest in the idea of management as a profession is symptomatic of a new and more responsible attitude. Drucker himself refers to his "conviction that the impact of the manager on modern society and its citizens is so great as to require of him the self-discipline and the high standards of public service of a true professional"[28].

The term "professional" as used in this context does not connote that managing as an occupation is assuming *all* the characteristics associated with the older professions. Most of the older professions are concerned with individual skills and responsibilities. It is inherent in the idea of a manager that he is responsible to and a leader of a group. It does, however, suggest that today those responsibilities are seen in a wider context than that suggested during the period by a British economist who in criticizing the idea of the professionalization of management observed:

"The professional man is conservative and cautious by nature; the businessman ought to (but now so seldom does!) think in terms of bold innovation—he must rush in wherever money can be made" [29].

This widening of the manager's responsibilities was expressed most clearly during the period by Ralph Cordiner when, as president of the General Electric Company, he delivered the McKinsey Foundation Lectures at Columbia University:

"General Electric . . . is managed by professional managers. . . . The work of management is tending to become professional, as a distinct kind of work in itself. . . . This professional approach requires, in fact, a dedication of the man's self and service not only to the owners of the business through his Board of Directors, but also as a steward to the Company's customers, its industry, its employees, and to the community at large. The professional manager must consciously place the best-balanced interests of these ahead of his personal interests. The corporate manager today thus has an opportunity and an obligation for service comparable to the highest traditions of any professions in the past" [30].

General Electric is among the first dozen "blue chip" corporations in the United States. What its president is thinking today, American business at large is very apt to be thinking in five or ten years' time.

The Internationalization of Management

Largely as the consequence of Marshall Aid—surely one of the most generous and farsighted gestures in history!—there is a world-wide awareness that management is a necessary and scarce resource for economic development. This applies in particular to underdeveloped countries. Management is no longer an exclusive affair of the "White Man." The International Committee for Scientific Management, which at the beginning of the decade was almost wholly United States-European, now has Pan-American and Indo-Pacific Regional Organizations. A report on management training presented to the Twelfth International Management Congress, held in Australia in 1960, cited recorded experience from more than 30 countries [31].

This emphasizes the need for a management philosophy and "discipline" which are learnable and which are not founded on the traditions or culture of any one country. They should refer to basic responsibilities and commitments, rather than to skills and technical knowledge. The need for a clarification and simplification of the terminology of the subject as an essential step to interracial communication is urgent

Top Management

It has been said that "Top Management" is "the least known, the least studied, and the worst organized part of management" [32]. The phrase itself is something of a "terminological inexactitude." It derives from the dual use of the word *management* as implying (*a*) on the one hand the executive aspect of the art of governing [33], and on the other (*b*) the over-all conduct of competitive business enterprises as contrasted with undertakings in public ownership. To conduct a business undertaking is unquestionably to govern it. But the unpopularity of government ownership with many businessmen leads them to adopt an alternative word. Consequently, they apply *management* both to the over-all task of conducting a business as well as to the specifically executive aspect of that task.

The confusion due to this double use of the same word has been complicated further in recent years by what has been described as "the gradual erosion of the Board of Directors as a functioning organ of the enterprise" [34]. The distinction between the legislative and executive functions of government has long been recognized as of importance in American political thought. And in law, as it relates to business, the legislative or policy-making function is assigned to the board of directors while the executive function is that of the president and his principal subordinates.

But, in fact, since "the Board as conceived by the lawmaker is at best a tired fiction" [35], much of the legislative or policy-making function, especially in the larger corporations, has devolved onto officers of the corporation who describe themselves as "executives." In the General Electric Company, for instance, it appears that the term *operating* has been substituted for the word *executive*, as the functions connoted by that word have been understood hitherto in smaller corporations, and the word *executive* has been, as it were, moved up a step and turned into a title of status for those at the center who in fact do the policy-making and perform the central administrative functions for the group as a whole [36].

There is no practical objection to such arrangements. Indeed, with very large corporations, it is difficult to see how a board of part-time directors could be expected to fulfill adequately the policy-making and central administrative functions allocated to them by the law. But it appears a matter for regret that the term "executive," which previously carried a useful connotation of function in political science, should be diverted into a status label. Once this occurs any term so associated with personal prestige becomes virtually useless for purposes of exact discussion.

It is also possible that, with the assumption of policy-making activities by so-called executives, there may arise confusion between the policy-making and executive functions. The distinction originally drawn by Oliver Sheldon between "administration" and "management" will be lost [37]. This has dangers. It has been well said that "once politics enters, the entire edifice of an enterprise built upon expert skills becomes unsafe. . . . The whole enterprise would be infected by half-technical, half-political judgments. . . . Public confidence in its integrity would soon fade. . . . There are all kinds of politics; administrators and experts must see to it that they keep out of all varieties" [38].

It has come to be well understood that, despite its tremendous social importance, management is a specific area of human activity which must be kept within its proper limitations to be effective. It is no part of its function to attempt to intervene in issues of government. But, since every business enterprise operates within a large environment of which local and central governments are a part, it is inevitable that issues will arise in the conduct of its affairs in which political prejudices and allegiances must have some influence. It is of the greatest importance that such issues should be divorced as far as it is humanly possible from questions of executive management.

There is also a fairly strong segment of informed opinion which holds that "the erosion of the Board of Directors" is to be regretted, that business is the loser by this tendency, and that effort should be directed rather to reinvigorating boards so that they fulfill the functions contemplated by the law than to substituting other machinery [39].

The problem of so-called "top management" is not therefore resolved. But in the decade under review it has attracted attention and has been brought more clearly into focus.

Areas of Regression

There are also areas in which, during the past decade, there has been definite regression, a loss of clarity and definition and the replacement of clear concepts by a certain confusion.

American belief in "progress" has its disadvantages. These include an overconfidence in the "discovery" which is "just round the corner" and an impatience with historical process. The immense urban development which has characterized the United States during the current century has emphasized the economic importance of its values. It has paid speculators to rip down valuable investment in buildings having still many years of useful life, in order to realize the larger rentals available by building again from the ground up.

This policy of scrap and rebuild is not, however, applicable to knowledge and particularly to the body of knowledge bearing on a practical art. With such bodies of knowledge, as for instance with medicine, the process of growth is evolutionary. Here and there a sudden advance in this area or that throws a flood of new light upon important issues. The name of a Pasteur or a Curie is graven imperishably upon the record. But on the whole growth is by slow accretion, thousands of faithful research workers and practitioners each adding his tiny contribution to the building and counting himself fortunate if his name is not forgotten entirely within a few years of his passing.

Moreover, in a practical art, the gains in knowledge which are secured become incorporated in practice. The effect of challenging them, of undermining men's confidence in their validity, is not to clear the ground for a better alternative, unless that alternative is already developed to the point at which it can be applied by ordinary practitioners. It is merely to weaken their reliance on the body of knowledge as a whole, to turn them backward toward individual personal experience and "hunch."

The reason why there has been this retrogression in certain directions is the development of educational apparatus undisciplined by close association with "clinical experience," touched upon earlier in the paper.

Specific instances of this regression are as follows:

(*a*) Attempts to minimize the significance of Frederick Winslow Taylor's achievement and even to throw doubt on his integrity [40].

(*b*) Efforts to discredit the work of organization theorists prior to 1930. It is common form to refer to their ideas as "classical" or "traditional." In the context of the American belief in progress such epithets are, of course, perjurative [41].

(*c*) Neglect of the work of the late Mary Parker Follett [42]; e.g., the current practice of referring to "decision-making" as though it were the core of all managerial activities, entirely ignores her warning against overdramatizing the making of decisions and her reminder that "a decision is only a moment in a process" [43]. A recent article on *Leadership* which professed to review earlier work on the subject did not mention her name [44].

(*d*) The attacks on the work of the late Prof. Elton Mayo. Mayo was a scientist to his fingertips, with training in both psychopathology and medicine. As one student of his work who did not agree with many of his conclusions has observed, his critics "have subjected the putative motivation and the level of professional integrity of the human relations research workers to a form of unfriendly public scrutiny which must be quite rare in the literature of the social sciences"[45].

The "Behavioral" Sciences

More generally the study of management has proved so fattening an academic pasture that exponents of a number of "fringe" disciplines, previously not too popular with students, have moved into the field. Their very language sometimes betrays a combative rather than a collaborative intent [46]. Their forays would be stimulating rather than confusing were it not that some of these "disciplines" themselves are divided into a number of factions and "schools" [47]. They are therefore in no condition to undertake the somewhat delicate task of integrating their findings and methods with those of teachers of management who are themselves actively evolving a broader approach to their task.

Probably the direction in which these academic differences have most complicated the study of management is in the matter of leadership. The article already quoted opens with the observation, "Of all the hazy and confounding areas in social psychology, leadership theory undoubtedly contends for top nomination" [48]. The author does not aid in simplifying the problem by attempting to apply to it the argument from the paradigm case, the cornerstone of linguistic philosophy [49]. Yet any young officer who has been trained properly knows what leadership is. Businessmen would be well advised to leave the academic sociologists to fight out the battle of theory and to direct their attention to more practical sources of information.

Management Science

The development of electronic calculating devices has opened up the possibility that business may be assisted to marshal the facts bearing on decisions of many kinds and to precalculate the effects of decisions susceptible to statistical treatment, on a scale and at a speed which may well revolutionize many established methods of management. Of this there can be little doubt.

But to recognize this is very different from imagining that by submitting facts which are themselves open to doubt, the springs of human motivation for instance, to statistical treatment and mathematical expression, we are thereby securing answers which are more "scientific." When punched-card machinery was first introduced many businessmen imagined that they could "buy" efficiency, only to discover that they had wasted their stockholders' money.

Whatever the improvements in mathematical techniques and in the mechanisms for applying them, decisions which depend on the reactions of individuals and of groups will continue to call for responsible judgment, unless and until the sciences bearing on human behavior, individual and social psychology, are themselves exact studies. And that in its turn must depend on advances in our knowledge of the biology and biochemistry of the human nervous system which are still speculative.

That future managers should be trained to use these mathematical techniques is much to be desired. That they should be led to imagine that, because they can use them, human insight and social understanding are no longer necessary, would be merely to repeat on a larger scale the mistake of the early *laissez-faire* economists. In seeing man solely as "an inanimate globule of desire for gain" [50], they were betrayed into a massive miscalculation about the foundations of morale of which the present world-wide conflict between labor and capital is merely the aftermath.

A Semantic Swamp

Apart from the danger of a false scientism, probably the most serious symptom that management philosophy is not as healthy as it might be, is the immense confusion of its terminology. There are no standard or accepted definitions of the vast majority of the terms used in writing about it. It is no exaggeration to suggest that as a subject it is engulfed in a semantic swamp. Until that situation is corrected any development of a common understanding of principles and practices is gravely handicapped. As Prof. J. B. S. Haldane observed more than thirty years ago, "Mechanics became a science when physicists had decided what they meant by such words as weight, velocity, and force, *but not till then*" [51].

A Footnote

More than one teacher of management in the United States has told the author that he considers Philip Woodruff's "The Men Who Ruled India" (St. Martin's Press, New York, N. Y., 1954) the best book on management published during the decade. This story, told in "cases," of the British administration of India, does not appear at first glance to come within the management area. But Drucker has written, "only this book can be said to represent a major *new* contribution to the knowledge, the thinking, and the understanding of management" [52]. The author, as a British national, would have hesitated to state such an opinion, much as he admires Woodruff's book. But Drucker is well qualified to speak. May his view stand alongside the author's recommendation of Drucker's own work.

References and Notes

1 C. Wright Mills, "The Sociological Imagination," Oxford University Press, New York, N. Y., 1959, p. 89.

2 Frederick Winslow Taylor's phrase, "Scientific Management,' Harper & Bros., New York, N. Y., 1947; "Testimony," p. 27. Taylor described one of the two elements constituting the "mental revolution" which was "Scientific Management" as the recognition by both sides to industry "as essentially the substitution of exact scientific investigation and knowledge for the old individual judgment or opinion. . .in all matters relating to the work done in the establishment" (ibid., p. 31). Earlier he had written: "Management will be studied as an art and will rest upon well recognized, clearly defined, and fixed principles instead of depending on more or less hazy ideas received from a limited observation of the few organizations with which the individual may have come in contact." (Ibid., "Shop Management," p. 63.) The author suggests that the degree to which Taylor forecast the development of education for management in this century is not always appreciated fully. The second passage quoted was published in 1903.

3 The Wharton School of Finance and Commerce, University of Pennsylvania.

4 Robert Aaron Gordon and James Edwin Howell, "Higher Education for Business," Columbia University Press, New York, N. Y., 1959, p. 26. The figure given excludes engineering schools offering a curriculum in industrial engineering which number about 50 and other instruction in management given in engineering schools.

5 Op. cit., note 4, p. 239. It is not clear what proportion of the junior colleges actually offer such a course.

6 Francis Bacon, "Essays," "On Studies."

7 In 1936 the late Edward R. Stettinius, Jr., then Chairman of the Finance Committee of the United States Steel Corporation, referred to "the catch-as-catch-can methods which business all too frequently employs to find its future executives." Quoted in Stephen Habbe, "Company Program of Executive Development," *Studies in Personnel Policy* No. 107, National Industrial Conference Board, New York, N. Y., 1950.

8 In the report quoted in [7] the author relates that the National Industrial Conference Board attempted to make a study of training programs for executives in 1946, to discover "that there were not enough such programs to form the basis for a report"; ibid., p. 3.

9 L. Urwick, "Management Education in American Business," American Management Association, New York, N. Y., 1954.

10 Ibid., cf. pp. 79 and 80 and Figs. 1 and 2 (p. 88), for methods of executive development on the job.

11 Peter F. Drucker, "The Practice of Management," Harper & Bros., New York, N. Y., 1954, p. 277 and the whole of chapter 21, "Is Personnel Management Bankrupt?" pp. 271–288.

12 Gordon and Howell, op. cit. [4], p. 294.

13 (*a*) Gordon and Howell, op. cit. [4]. This study was sponsored by the Ford Foundation. (*b*) Frank C. Pierson and others, "The Education of American Businessmen," McGraw-Hill Book Co. Inc., New York, N. Y., 1959. This study was sponsored by the Carnegie Corporation.

14 Wayne A. R. Leys, "Ethics for Policy Decisions," Prentice-Hall, New York, N. Y., 1952.

15 Op. cit., note [11], 1954.

16 *Harvard Business Review*, vol. 36, no. 5, Sept.–Oct., 1958, notably: (*a*) Theodore Levitt, "The Dangers of Social Responsibility." (*b*) Arthur H. Cole, "Transcendental Aspects of Business." (*c*) Benjamin M. Selekman, "Cynicism and Managerial Morality." (*d*) Arnold J. Toynbee, "Will Businessmen Be Civil Servants?" (*e*) Richard F. Ericson, "Should Management Be Idealistic?"

17 (*a*) Marshall F. Dimock, "A Philosophy of Administration," Harper & Bros., New York, N. Y., 1958. (*b*) Benjamin M. Selekman, "A Moral Philosophy for Management," McGraw-Hill Book Company Inc., New York, N. Y., 1959. (*c*) Dann H. Fenn, Jr., "Management's Mission in a New Society," McGraw-Hill Book Company Inc., New York, N. Y., 1959.

18 This view is advanced with some diffidence. It is manifestly impossible for any individual, even if he devoted a seven-day week to reading in this one field alone, to begin to keep pace with the flood of literature bearing on management which pours from the presses in the United States. This *embarras de richesses* while bearing witness to the widespread and encouraging interest in the subject is a genuine handicap to a clearer understanding of its philosophy. It is, in part, a consequence of the development of academic apparatus unbalanced by contact with practice already emphasized. Too many of the books are manifestly written for captive audiences of students for whom they can be made "prescribed reading" or are symptomatic of the occupational disease of the academic calling described by the late Elton Mayo in the phrase "they write books about each others' books."

19 Drucker, op. cit., p. 37; cf. F. W. Taylor, op. cit., "Principles," p. 136: "At the first glance we see only two parties to the transaction, the workmen and their employers. We overlook the third great party, the whole people—the consumers who buy the product of the first two and who ultimately pay both the wages of the workmen and the profits of the employers. The rights of the people are therefore greater than those of either employer or employee."

20 Ibid., p. 3.

21 Ibid., p. 36.

22 Ibid., p. 390.

23 Ibid., p. 391.

24 Ibid., p. 157.

25 Ibid., pp. 147, 157, 158, 196, 345, 348, 349, 370, 378.

26 Ibid., p. 392.

27 Drucker, op. cit., p. 157, cf. Field-Marshal Sir William Slim, G.C.B., etc., addressing, as Governor-General of Australia, the Sydney Division of the Australian Institute of Management on "Leadership," Nov. 25, 1953. After listing courage, will power, flexibility of mind, and knowledge of four qualities essential in a leader, he continued: "If you have the qualities I have mentioned. . . you will be a leader. But without one other quality you won't necessarily be a leader for good. The last quality, on which all the other qualities have to be based, is integrity—the thing that makes people trust you." (Pamphlet published by the Australian Institute of Management.)

28 Drucker, op. cit., p. 9.

29 Roy Lewis and Angus Maude, "Professional People," Phoenix House, London, England, 1952, p. 120.

30 Ralph J. Cordiner, "New Frontiers for Professional Managers," McGraw-Hill Book Company, Inc., New York, N. Y., 1956, pp. 16 and 17.

31 Rolf Nordling and the French National Committee for Scientific Management, "Developing a National Pattern for Education and Training of Managers," Twelfth CIOS Congress, Melbourne, Victoria, March 1, 1960. Printed in the Proceedings of the Congress.

32 Peter F. Drucker, letter to ASME, Dec. 21, 1959.

33 Cf. "A government without good management is a house builded on sand." Report of the President's Committee on Administrative Management, Government Printing Office, Washington, D. C., 1937; and "In creating the TVA Congress adopted and carefully wrote into law the basic principles and practices of modern management." David Lilienthal, "TVA—Democracy on the March," Penguin Books, London, England, 1944, p. 144.

34 Peter F. Drucker, op. cit., p. 178.

35 Ibid.

36 Cf. Cordiner, op. cit., p. 68. "The Executive Vice-Presidents in General Electric are true Executives. That is, they have been freed of operating responsibility and administrative detail so that they can devote their time to long-range planning, appraisal of current performance, bringing divisional objectives and plans into a working pattern with over-all company needs, and making sure of the needed continuity of competent managerial and other personnel in the decentralized business."

37 Oliver Sheldon, "The Philosophy of Management," Sir Isaac Pitman & Sons, Ltd., London, 1924. Reprinted in "Classics in Management," American Management Association, New York, N. Y., 1960.

38 David E. Lilienthal, op. cit., pp. 158, 159.

39 Cf. E. Everett Smith, "Management's Least-Used Asset: the Board of Directors," in "The Dynamics of Management," American Management Association, Report No. 14, 1958, pp. 49–60.

40 Cf. Milton J. Nadworny, "Scientific Management and the Unions," Harvard University Press, Cambridge, Mass., 1955 and John H. Hoagland, "Management Before F. W. Taylor," in *Proceedings of the Annual Meeting of the Academy of Management*, New York, N. Y., 1955.

41 Cf. Professor Ernest Simon's chapter on "Some Problems of Administrative Theory" in his "Administrative Behavior," The Macmillan Company, New York, N. Y., 1947, pp. 20–44. He reprinted this chapter in his second edition, 1957, and confirmed it in his Introduction: "I see no reason to depart from my original valuation of the 'principles' as essentially useless." The whole of this chapter is an example of destructive dialetic. Its argument turns on the meaning assigned to the term *principle*. Yet nowhere in the chapter does Professor Simon define the meaning in which he is using this term.

42 Cf. "Dynamic Administration," edited by H. C. Metcalf and L. Urwick, Harper & Bros., New York, N. Y., 1942, and "Freedom and Coordination," edited by L. Urwick, Sir Isaac Pitman & Sons, Ltd., London, England, 1949.

43 "*Dynamic Administration*," p. 146.

44 Warren G. Bennis, "Leadership Theory and Administrative Behavior: the Problem of Authority," *Administrative Science Quarterly*, Cornell University, Ithaca, N. Y., vol. 4, no. 3., December, 1959.

45 Henry A. Landsberger, "Hawthorne Revisited," Cornell University, Ithaca, N. Y., 1958, pp. 50, 51.

46 Cf. "Within the past two decades, economists have watched the growth of a new and vigorous competitor, equipped with a different view of the nature of man and a different vision of human welfare. During this period a group of sociologists has arisen to take the industrial community and its subdivisions as its province," C. Kerr and L. Fisher, "Plant Sociology: the Elite and the Aborigines," in "Common Frontiers of the Social Sciences," edited by M. Komarovsky, Chicago, Ill., 1959, p. 282.

47 C. Wright Mills, op. cit., note [1], for an analysis of the various fractions which can be identified currently as forming parts of the sociological discipline in the U. S. A.

48 Bennis, op. cit., note [44].

49 Cf. "An influential contemporary school with many very able adherents in England and the U. S. A. would reduce philosophy to the modest task of attempting to cure the occupational diseases of philosophers. I will not speculate how long an impoverished community, such as contemporary England, will continue to pay the salaries of individuals whose only function, on their own showing, is to treat a disease which they catch from each other and impart to their pupils." Mr. Broad, a Cambridge Philosopher, quoted from Ernest Gellner, "Words and Things," Gollancz, London, 1959.

50 Thorstein Veblen.

51 J. B. S. Haldane, "Science and Politics," in "Possible Worlds," Chatto and Windus, London, 1928, p. 185. L. Urwick, "The Problem of Management Semantics," *California Management Review*, vol. 2, no. 3, Spring, 1960, for a fuller discussion of this problem.

52 Letter to ASME, December 21, 1959.

DISCUSSION

For discussion on this paper, see the paper by A. M. Lederer, p. 255.

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Philosophy of Management[1]

The subject of the report, Ten Years' Progress in Management, of which this paper is a part, and the title, "Philosophy of Management," portray an anachronism. They imply that from 1950 to 1960 progress in "management" has been made and that as the result of that progress a "philosophy of management" may have progressed within the total, presumably measurable progress. Progress in any physical or intellectual endeavor assumes a striving toward a set goal from a definite point of departure, and a system of measurement by which that striving-toward can be evaluated.

We hold that there has been no progress in "philosophy of management" because there had not been formulated at any given point of time an exposition of a philosophy of management, the validity of which could have been tested and generally accepted, and the progress of which could have been measured through its acceptability.

The literature (Bibliography at end of paper) in the past ten years is resplendent with attempts and searches for a philosophy of management, and it is to this search that we address ourselves in the hope that a valid, testable philosophy will evolve.

The very fact that this fifth report of The American Society of Mechanical Engineers, and one covering roughly a decade, includes for the first time a paper on philosophy of management is recognition in itself that the subject has occupied a great many minds during the past ten years.

The reasons for that preoccupation with the search for a philosophy are deeply embedded in the very nature of the evolution of our culture, and the constant quest for truth and meaning in human endeavor. Further, when the results of an intensely personal human act, that of managing, increasingly and in an ever-widening circle, affect others, then the yearning for some order and understanding of the complex process of human interrelationship gives rise to an attempt to discover a philosophy.

This quest for truth, for a "system of order," for purpose in the action of managing, spawned "theories of management," "theories of decision making," "science of management," and "creeds of management," and some tentative, wobbly steps in the direction of a "managerial philosophy."

The "progress" toward an attempted formulation of a philosophy of management has been slow because, we believe, of confusion in the interpretation and use of words pertaining to the act of managing and perhaps of a fundamental error.

The Confusion

Management is defined with joyful interchangeability as a body of knowledge pertaining to the art of management, or a body of men engaged in the act of managing. Management, the body of men, is further subdivided into "top management," "middle management." "Business management" again is either treated as a body of men engaged in business, or as a body of knowledge—not necessarily residing in the same body of men—of business. In addition, management is meant without qualifying adjective or nouns—exclusively—to connote business (commercial, industrial, and farming) and other profit-making enterprises. And yet, management sits in body or knowledge and is exercised in other than profit-making institutions, including government, agriculture, and the home.

Further, different writers on the subject apply "philosophy," not unlike "management," in a variety of meanings, leaving it to the reader to accommodate himself to any self-preference.

Philosophy is thought of as a set of philosophical principles; a system of principles underlying a brand of learning or of a major discipline; an integrated and consistent personal attitude toward life and reality; or a practical or moral wisdom. In essence, however, philosophy means and has meant the *whole* of man's perception of himself in relation to his surroundings and his destiny. Philosophy comprises logic, ethics, aesthetics, metaphysics, and the theory of knowledge. Philosophy then comprises the whole of Man's perception of himself and his surroundings, known and intuitively revealed.

If the confusion in the use and meaning of words would be considered wholly a problem of semantics, the reason for the acute chaos in arriving at a philosophy of management would remain undisclosed, and the exercise of solving the dilemma by better definition would only compound the disorder.

But this is precisely what we believe has been happening during the past decade, when a part of human activity, as that of managing, was further subdivided into different *kinds* of managing and each part was examined by itself without regard to the total whole of Man.

The Error

To suggest the dilemma points up, we believe, where the fundamental error in the quest for a philosophy of management lies; that the act of managing, based on certain formulated knowledge, intuition, and desire, is something distinctly different, separate, and apart from the *whole* of Man's character and philosophy.

Increasingly, during these ten years, many students and writers on the managerial process became alarmed over the fate of the individual "enmeshed or trapped" in the managerial and decision-making process. It was held that the organized managerial efforts tended to stifle, hinder, and warp the development of the individual man. The basic premise of our American culture, that the individual was supreme, was thought to be violated by a conscious attempt or unconscious desire to make all individuals conform to a preconceived pattern of behavior, or by trying to find a common denominator in all human beings and then to weld from it a totalitarian man.

The danger is that, if the confusion in the undisciplined use of the terms management and philosophy continues to prevail and the error of separateness is not corrected, no valid *philosophy* of management will emerge. At best, the act of managing will deteriorate into becoming an application of diverse mechanistic systems, each excessively stimulated to impose its own laws and concepts without regard to the total whole. Further, this fragmentation into assertively self-contained parts of different

[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

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kinds of managing, each striving to posture as the whole of the art or science or both, will produce the opposite effect from that envisioned by the practiser of the art; namely, that the manager is the integrator and developer of spiritual and material forces for the attainment of stated objectives. "The ultimate criterion of the value of a functional whole is the degree of its internal harmony and integratedness, whether the functional whole is a biological species, or a civilization, or an individual. A whole is defined by the pattern of relations between its parts, not by the *sum* of its parts, and a civilization is not defined by the sum of its science, technology, art, and social organization, but by the total pattern which they form and the degree of harmonious integration in that pattern."

It seems, therefore, that the still prevalent fragmentation of the knowledge of managing into isolated "theories" and "sciences" would make the formulation of a philosophy of management impossible unless we can return to the main stream of thought from which those many rivulets sprang. By such rediscovery, we may find the true basis for a philosophy.

The Road Back

The act to manage (manhandle, use, direct) something or somebody is as old as Man. Even in his primary existence, Man had to make certain decisions, intuitively given or by the use of the reasoning process deducted, to attain certain objectives, prestated by desired or intuitively felt or instinctively perceived. In the exercise of his struggle to survive, he managed himself, his household, his possessions, and, if a leader, his tribe or clan. To manage, to get things done purposely, was and is a distinct art of Man, inherent in his desire to survive and to enhance himself. As Man increasingly had to cope with others of his species and the world around him, he progressively came in conflict with others of his species, their desires and objectives, with animals, natural forces, and materials.

Again, he used his managerial talents to direct, plan, act, and integrate other talents and forces to progress in his pursuit.

It seems, therefore, that contrary to popular belief, the art of managing antedates any other art, science, or profession. To manage, then, is an integral part of human life itself.

But Man managed himself not only for the attainment of material, but also spiritual and religious values and enhancement. He managed within and based on his own beliefs of his relationship to the world and to the Universe surrounding him.

But the methods of managing oneself for the attainment of a given objective, intuitively desired or believed in or perceived, are not necessarily applicable to the managing of others. Whereas in the managing of oneself, one deals with one's own recognized or sensed limitations, aspirations, dreams, weaknesses, and strength, in the process of dealing with others, *their* conception of *their* individual hopes and aspirations have to be reconciled with one's own.

From the dawn of Man's history as a member of a tribe to rather modern times, the manager of groups of the managed ones, managed within the socially accepted or imposed hierarchial concept of power. That power originated with kings, headmen, Caesars, or chieftains, and it flowed from there down to the head of the family.

The act of managing was predicated for its result on the element of power, and the power of managing rested on the power to command.

When managers, men of the same calling, banded together for their own material gain, physical safety, and spiritual progress to form guilds, castes, alliances, and orders, the art of managing ever larger groups of people, each engaged in specific activities, each trying to perpetuate and further its own position within the general pattern of the accepted or imposed social culture, began to take the aspects of special group movements.

This ever-widening tendency to submerge the individual into a group, caste, class, or guild was brought to a temporary standstill with the American Revolution, which reoriented Man's striving through the ages for maximum individual freedom, and it cleared his vision once more.

When the industrial revolution, sparked by the discovery that mechanized machines could multiply Man's hand skill a thousandfold, burst upon the world, the stage again was set to mold the individual into another kind of caste, that of the mechanical extension of the machine.

This headlong drive into oblivion of Man, the individual, was stopped at that time by the introduction of scientific management, which proposed to bring a certain order into Man's economic activities—his work. It was the beginning of the managerial revolution.

The essence and theory of scientific management—and a theory proved valid—was that any form of activity could be analyzed, planned, and executed in order to increase productivity, reward, and leisure, by introduction of systems of precise measuring and the formulation of laws governing the act of managing. The historical fact, that this concept of scientific analysis, planning, measuring, and evaluating was born in the industrial shops of manufacturing, gave rise to the thought that managing was an art or theory only applicable to industrial enterprises, producing the error that the new-found methods and theory of managing were not a natural evolution of an old human activity, inherent in the very life of the individual, but were something new, in addition to and apart from it.

Although the exponents of scientific management saw this danger of separateness and tried to apply the theory of transference of skills, based on analytical determination to all walks of life, and for the enhancement of all of Man's activities, the bugle for freedom was only heard by those engaged in industrial pursuit. A formulation of a philosophy shattered on the rocks of the notion that management, because of its origin, applied to the human endeavor in industry alone. It therefore became or attempted to become a philosophy of the industrial enterprise.

We believe, therefore, that the point in time and thought, when a valid philosophy of management could have been evolved but was not, was precisely at the time when scientific management made its appearance and when, as the consequence of its discovery, and against the will of its authors, management became synonymous with the managing efforts of industrial and commercial enterprises.

The Road Forward

We claim that the confusion about the meaning of words can be laid to rest, the battle for definition can be stilled, and the error of splintered pursuit for a philosophy of management can be retrieved when it is recognized that the act of managing, i.e., planning, directing, executing, is an inherently natural, intrinsic part of Man, the individual, no matter what his calling.

The logical conclusion is therefore that the *act* of managing or the mass (body) of knowledge can have no philosophy, but that the perpetrator and the user of the act does. The multitudinous interrelationship between men, each a manager, demands that a philosophy can be found upon which all functional and other theories and principles of managing can be built. The search then is not for a philosophy of management but a *philosophy* of *managing*.

That kind of philosophy is the search for wisdom to understand Man, the individual, in relation to his surroundings, the Universe, and to manage according to that perceived truth. We believe that the literature in the past decade is the prelude to the future evolvement of a philosophy of managing. Operational concepts, like decentralization of responsibility and authority, the pre-

occupation of life scientists with the process of managing, all bear witness to this search for a basic philosophy that should guide all managerial acts.

And that philosophy of managing must be a part and not apart of Man's beliefs in the same manner as managing is a part of Man's total being. As Man's striving for individual liberty and freedom of choice has dominated his struggle for survival, so then must a philosophy of managing give expression to his aim, and theories and principles be fashioned to make the philosophy meaningful and testable.

Although there are many religions, there are only two basic concepts utterly antagonistic to each other of the relationship of Man to the Universe, the worlds that surround him. One concept holds that Man is a chance arrangement of molecules and nothing else, and he is so to be regarded and dealt with. The other holds that Man is part spirit, and in that part eternal, and responsible to a higher Authority, Creator, and Governor of the Universe.

We hold that any philosophy of managing can therefore only be formulated on either one of these two concepts. It cannot be on both, because the theories and principles evolving from either would be, and must be, radically different and opposed to each other. Hence, a *universally* applicable philosophy of managing is impossible to devise as long as no measurably valid proof exists that would make one or the other concept erroneous by demonstrable facts.

Believing, as we do, that the beginning and end of Man, the individual, is the spirit, we feel that a philosophy of managing applicable to all men can and probably will be postulated in the years to come, and that all current theories and principles pertaining to the art and science of managing will be re-examined, reoriented, and executed in the light of such philosophy. We further believe that at that time the real managerial revolution will begin. The present search then will not have been in vain.

Bibliography

F. W. Abrams (Standard Oil of New Jersey), "A Businessman Looks at Education," *The Saturday Review*, April 19, 1952.

F. W. Abrams, "Business Contributions to Education," February 11, 1953 (speech).

F. W. Abrams, "Management's Responsibilities in a Complex World," *Harvard Business Review*, May, 1951.

F. W. Abrams, "The Professional Character of Business Management," November 30, 1950 (speech).

"Human Relations in Industry," from "Aims of Industry" (a collection of essays), London, England, 1956.

L. A. Allen, private letter in response to ASME query.

"Strengthening Management for the NEW Technology," General Management Series, No. 178, American Management Association, New York, N. Y., 1955.

"Management Creeds and Philosophy" (a research study number), American Management Association.

"Fitting Management Development to Company Needs," General Management Series, No. 174, American Management Association, 1955, Meeting of January 24–27, 1955.

Melvin Anshen, "Price Tags for Business Policies," *Harvard Business Review*, January-February 1960, p. 71.

L. A. Appley, "Management in Action."

J. Ayres, "Increased Productivity Is Management's Responsibility," *Mass Production*, vol. 28, 1952, pp. 52–57.

L. D. Baldwin, "The Story of the Americas," New York, N. Y., 1943.

E. H. Bellows, "The Assistant to Top Management," *Advanced Management*, vol. 21, 1956, pp. 9–11.

C. J. Berwitz, "Beyond Motivation," *Harvard Business Review*.

F. S. Blackall, Jr., "The Obligation of Management to Provide Leadership," the 1949 Towne Lecture, *Mechanical Engineering*, vol. 72, 1950, pp. 229–231; discussion, 1950, p. 751 (criticism).

Allen Booz and Hamilton Booz, "The Making of Company Policy," a 19-page study.

K. E. Boulding, "Religious Foundations of Economic Progress," *Harvard Business Review*, May-June, 1952.

James Burnham, "The Managerial Revolution," The John Day Company, New York, N. Y., 1941.

B. R. Canfield, "Public Relations: Principles, Cases, and Problems" (revised), Richard D. Irwin, Inc., Homewood, Ill., 1956.

T. C. Cochran, "Business and the Democratic Tradition," *Harvard Business Review*, March-April 1956.

R. C. Davis, private letter in response to ASME query.

E. W. Dodge, "Management Development—Planning for the Future," *Westinghouse Engineer*, part 15, 1955, pp. 71–73.

J. M. Dodge, "Some Special Characteristics of Successful Management," *Advanced Management*, vol. 20, 1955, pp. 5–8.

P. F. Drucker, "The Future of Industrial Man: A Conservative Approach," The John Day Company, New York, N. Y., 1942.

P. F. Drucker, private letter in response to ASME query.

P. F. Drucker, "The New Society."

L. K. Ellis (Eastman Kodak), "Influence of Policy on Management Conduct," summary of a talk, National Industrial Conference Board, January 16–17, 1958.

J. E. Ellsworth, "New Perspectives," a paper prepared following a trip to Italy as a CIPM member of a seminar team, 1952.

Glenn Gardiner, "My Management Philosophy," *Advanced Management*, November, 1958, p. 25.

Thomas Gordon, "Group-Centered Leadership," Riverside Press, Cambridge, 1955.

J. P. Grace (W. R. Grace and Company), "Dynamics of Industrial Planning," 1956.

J. P. Grace, "The Knights of Malta and the Western World," January 16, 1956 (speech).

J. P. Grace, "The Spiritual Responsibility of Business and Industry," October 16, 1955 (speech).

E. B. Hanify (Ropes, Gray, Best, Coolidge, and Rugg), "Leadership, An Exalted Trust," November 10, 1955 (speech).

A. Harvey, "Management Engineering and Architecture," ASME Paper No. 57—A-251; meeting December 1–6, 1957.

P. B. Hoffman, "Dangers of Management Specialization Today," *Advanced Management*, vol. 19, 1954, pp. 9–11.

R. Hull, "Art in Scientific Management," *Advanced Management*, vol. 22, 1957, pp. 5–8.

C. D. Johnston, "The Spiritual Responsibility of American Business and Industry," October 26, 1955 (speech).

"Company Objectives," a symposium of different companies—Johnson and Johnson, for one, prepared for the AMA Marketing Management Course, probably most of it is in the Thompson study.

J. B. Joynt, "Management's Basic Function and Policy Formulation," part 2, *Advanced Management*, September, 1954, pp. 21–24.

Erich Kahler, "Man the Measure," George Braziller, Inc., New York, N. Y., 1956, fourth edition.

B. E. Kline and N. H. Martin, "Freedom, Authority and Decentralization," *Harvard Business Review*.

R. T. Livingston, "A Model of Behaviour for the Manager."

R. T. Livingston and D. B. Hertz, "The Integration of Organization and Management," TRANS. ASME, vol. 73, 1951, pp. 997–1003; discussion, pp. 1003–1004.

H. F. Merrill, "Classics in Management," selections from the historic literature of management, edited by H. F. Merrill, New York, N. Y., AMA, 1960, $8.00. (This is principally historic.)

S. H. Miller, "The Tangle of Ethics," *Harvard Business Review*.

L. E. Newman, "Some Philosophies of Management," *Advanced Management*, vol. 24, 1959, pp. 6–8.

"How Managers Are Made," *Nation's Business*, March, 1956, 3-year study by General Electric.

M. C. Niles, "The Essence of Management," 1956.

O. A. Othman, "Search for Managerial Philosophy."

T. S. Petersen (Standard Oil of California), "Philosophy of American Management," September 8, 1955 (speech).

G. W. Peak, "More 'Personal' Responsibilities of Top Executives," *Advanced Management*, vol. 22, 1957, pp. 13–14, 31.

J. G. Pleasants, "Engineering in Management," *Mechanical Engineering*, vol. 74, 1952, pp. 781–783, 809.

H. W. Prentis, Jr., "The Essential Features of Good Management," *Mechanical Engineering*, vol. 78, 1956, pp. 1121–1124.

Eric Roll, "History of Economic Thoughts," New York, N. Y., 1942.

A. W. Rothe, private letter in response to ASME query.

R. B. Read, "Co-Ordinating Engineering Activities in Complex Organization," Paper No. 54—MGT-2 for meeting March 21–April 1, 1954.

H. H. Race, "Bedrock Foundations for Manager Development,' *Electrical Engineering*, vol. 75, 1956, pp. 534–537.

H. H. Race, "Managing Versus Manipulation," *Electrical Engineering*, vol. 77, 1958, pp. 897–902.

E. B. Roberts, "Simulation Techniques for Understanding Research and Development Management," *IRE National Convention Record*, vol. 7, part 10, 1959, pp. 38–43.

"Corporate Goals, Policies, Philosophies," *Sales Management*, quotes from Annual Reports of five corporations, March 6, 1959, pp. 62–63.

E. H. Schell, "Spiritual and Moral Values in Business."
B. M. Selekman, "Cynicism and Managerial Morality."
D. A. Shepard (Standard Oil of New Jersey), "The Modern Business Corporation as a Social Instrument for the Good Life," April 1, 1955 (speech).
T. G. Slattery, "A Working Philosophy for Engineering Management," in Engineering Management 1–2, Institute of Radio Engineers, *Convention Records*, part 11—*Engineering Management and Quality Control*, 1954, pp. 29–59.
H. F. Smiddy (General Electric Corporation), comments on "An Assignment for Intellectuals," March 5, 1956.
H. F. Smiddy and Lionel Naum, evolution of a "Science of Managing," in America.
Stewart Thompson, "Research and Information," preparation and use of company creeds, results of a survey, *Management News*, April, 1958. (This is a two-page summary of the Stewart Thompson study—"Management Creeds and Philosophies.") AMA Research Study No. 32, 1958, $3.00.
G. H. Thayer, "Management Considerations in Supplying Automation Philosophy," *Automation*, vol. 6, 1959, pp. 44–49.
L. F. Urwick, "A Nice Derangement of Epitaphs (The Problem of Management Terminology)."
A. H. Williams, "Business Leadership in a Democracy," *Mechanical Engineering*, vol. 75, 1953, pp. 284–286, 306.
J. Woodward, "Control and Communication: Management Concept of Cybernetics," *Institution Production Engineers Journal*, vol. 36, 1957, pp. 539–548.
"Developing a Company Philosophy," Weatherford Oil Tool Company.

DISCUSSION

C. R. Dechert[2]

I think that I express the sentiments of all when I remark my own appreciation of Mr. Lederer's analysis of the meaning of the term "Philosophy" as applied to Management and Colonel Urwick's extension of the profound thought which has characterized all of his works.

In essence, I would suggest that Mr. Lederer has noted the twofold meaning of Philosophy when applied to management: (*a*) Philosophy as a statement of individual and social values, that is, an ethical discipline which guides the manager as a person, (*b*) Philosophy as a statement of general norms and principles regarding the nature and functioning of social groups.

Mr. Lederer rightly notes in his conclusion that in the final analysis a "philosophy of management" must be founded on some metaphysical conception of man and the universe. However, his comment that the search is ". . . not for a philosophy of management but a *philosophy of managing*" would tend to reduce the quest to an ethical inquiry. Yet previously he notes some of the more basic problems; the nature of the social group, the nature of social leadership, power and authority, and the legitimacy of rule. In brief, many of the most basic problems of management are the basic problems of government.

Hence I suggest that there already exist many philosophies of management and that these may be found in the Histories of Social and Political Theory.

Indeed I would further suggest that our present concern for a philosophy of management is the direct result of the inadequacy of a traditional individualistic business ethos to the realities of the modern corporation. The modern enterprise was founded upon the essentially rationalistic and individualistic philosophy of Locke as developed, expanded, and applied to enterprise by Mandeville, Smith, Bentham, Riccardo, Mill, and Spencer. William G. Sumner, the greatest American philosopher of business, expressed these views for the United States. This essentially individualistic view permeates the works of Frederick C. Taylor, the founder of Scientific Management. You will recall that Taylor, in establishing work norms, would extract the individual from his working group and showed a preference for workers inspired by an individualist ethic.

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The crisis in this view of the enterprise came from two sources in the United States: (*a*) The Hawthorne Studies (anticipated to some extent by Mrs. Gilbreth) and (*b*) the social requirements of the great depression when it became evident that the "going concern" was a social entity in its own right and apart from considerations of profit or loss could not be destroyed, if large, without too severe social consequences.

In brief then I would suggest, not that we are initiating a search for a philosophy of management, but rather we are searching for a philosophy of management more adequate to the social nature of man and to the modern enterprise itself.

Colonel Urwick, in *The Pattern of Management*, comments ". . . one would have expected that political science would have been the father of a theory of management, not business" (p. 61) and he has, I believe set us back on the right philosophical track by suggesting in that same work that the management of the enterprise is a form of government.

This view runs through his paper today. The corporation is an immortal social entity whose managers or governors change while the corporation remains. And what is the goal of corporation? I suggest that we are returning, in the thought of men like Urwick, Drucker, Cordiner, and Galbraith, to something approaching the traditional view of the "common welfare"—of the corporation and of the community at large.

The facile view, still taught in too many of our business schools, is that the corporation exists "to make money." Such a view will inevitably lead to ever-closer governmental control of the corporation, as consumers and social critics lament, for example, "planned obsolescence" and that "repackaging" which so frequently results in smaller quantities at the same price. The business community itself takes a dim view of "wreckers" who destroy a going enterprise in order to make a quick profit. Urwick suggests that the enterprise exists to make "something" for society and that profit is the measure of efficiency in fulfilling a social want. There is the further problem of goals relevant to the corporation itself. Does it have a responsibility for the common welfare of its members? And who are its members? Only the stockholders? the managers? the workers? Perhaps one of the greatest break-throughs in an applied philosophy of management can be found in Thomas J. Watson's acceptance of responsibility for all of his employees during the great depression.

In conclusion, Colonel Urwick's comments today point up more detailed areas where we can look for guidance in history in the resolution of contemporary problems to which philosophy of management is fundamentally relevant. Is the business cynicism of which he speaks analogous to a Machiavellian *"real-politik?"* and what of the constitutional divisions of powers within the corporation? Is co-optation and approval of the Board an adequate mode of legitimating management? Are the power relations that go under the name "office politics" desirable or not? necessary or not? can they be organized constitutionally?

I suggest that both history and political theory have a direct relevance to today's problem—a philosophy of management.

Robert Teviot Livingston[3]

It is an important and significant fact that the ASME is considering the question of philosophy. This has long been due and perhaps when we brush away a few of the semantic problems and their psychological connotations we may be able to make some steps along that path of vital importance today, the path to the understanding of the place and the responsibility of the manager of today. His place as an integral *part of* not *apart* from the system which he is operating and his responsibility for the realiza-

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tion of the almost untapped potentialities of our greatest resources, the creativity of Man.

It may be hard for us in mechanical engineering, where it can be said that the management movement started, to accept the fundamental fact that managing is one of the greatest creative arts and one of the least understood or appreciated. It is essential that we consider our philosophy for a philosophy is the basis of any theory which deals primarily with men, as managing does. From the yet-to-be stated theory of managing, we shall, and indeed we must, abstract testable hypotheses and state the operational processes by which the manager will best discharge his responsibility, and this theory will not only consider the goals and his responsibility, but will also comprehend his personality and the individuality and the dignity of those who do the work. It is to this that we must dedicate ourselves if we are to realize our future in a free society and it is indeed well that the ASME and Dr. Lederer and Colonel Urwick are leading the way in this essential project.

However, we must start with basic thinking and the basis of our thinking must be rooted in the understanding of the words we use and, while to some this may seem like semantic hairsplitting, I believe that it is fundamental.

Management has no philosophy, nor can it. Management first exists in the minds of men, from which it is projected as an image, and while men may, and indeed often do, have a philosophy, an image cannot. Thus I urge you to consider first, that:

1 Management is a function and it is not a body of knowledge,
2 Managing is the process which is performed by men who are managers.

So, too, of decision and organization. These are static words and we are living in a dynamic society. Men make decisions; the process by which these decisions are arrived at is deciding. Men create organization; the process is organizing. This is of far more than mere academic interest. It is of vast importance if we are ever to make that first step to improve management, which is understanding of the process of managing.

Dr. Lederer has done a great service in pointing out the difference between the nonhuman concept which is management, and the human being who as a manager is managing. However, I feel that I must cavil with one of his premises. Not that he is not scientifically or perhaps formalistically correct, but the fact is that even if we do not have a formally admitted goal, and certainly not one that is subject to measurement, yet we do behave as if we did have one and in some way that behavior is conditioned by that goal, however poorly expressed or even unknown. Perhaps that is the engineering way, to constantly reformulate our unexpressed ideas as progress, whether measured or not, apparently brings us closer to it.

Colonel Urwick's objection to the title: "Ten Years' Progress in Management," is interesting. It is a common practice, and I suspect is prevalent in England as it is here, to periodically make progress reports. A statement that there has been no progress would be such a report and useable as recognition of the fact.

His comment upon "getting things done through people" might be considered under the two headings of:

The things to be done
. . . . . and . . . . . .
Through people.

There is no doubt that we have spent an inordinate amount of time thinking about the things to be done and how to do them and not enough thought to the "Through People." It is an interesting idea that modern industrial product design thinks a great deal about the people who are going to use the product. In "Management Design," however, very little thought has been given to the people who are going to apply the "things" or to whom the things are going to be applied. True it is that the various behavioral scientists have, of late, been having a field day and have been giving us a great deal of advice, some good, much fortuitous, and some which show that they are a bit naive and unsophisticated about the facts of life. However, the making of a technically perfect decision (and let's assume the computers can do such a thing,) is no assurance of a better result. Someone has to carry decisions into effect and a far from perfect decision tailored to the person who has to make it work can be far more effective than a so-called perfect decision which is not accepted or understood . . No, basically, managing deals with people and we must not forget their individuality and the basic dignity of all men.

Colonel Urwick seems to overlook the fact that managing is a universal function. Some people even manage themselves reasonably well. Incidentally, there has been a book written which discussed this interesting point. The function of management transcends the field of application and, in sheer number of activities, there is no doubt that nonbusiness management is far more important, not to mention perhaps far more difficult. There are other objectives besides profit making.

I must agree with Colonel Urwick's comments on the areas of regression. There is no doubt that we often think the new, the mechanical, the complicated, are *ipso facto* good, and that the old, human, and simple necessarily outmoded. One is reminded of a machine built by a forgotten genius once reported on in *Popular Mechanics;* on the throwing of a switch (and the machine nearly filled a room) things started revolving; jigglings, groans, and every form of motion set forth in the basic books on kinematics were gone through. This incidentally, was prior to the days of the more sophisticated electronics. After several minutes, a small bell rang once. No, more complication does not mean progress nor is it necessarily good.

During the past fifty years there has been a huge amount of literature on management in its various aspects. I believe we would make more progress if we considered the process of managing and the problems of the men who manage.

L. E. Newman[4]

Colonel Urwick and Mr. Lederer have made profound observations on the Philosophy of Management for which I feel appreciative. It may seem only a play on words when Mr. Lederer says, "The search then is not for a philosophy of management but a *philosophy of managing.*" It is much more than this, for it emphasizes the importance of the *conduct of the individual manager* rather than the performance of an impersonal team of managers.

Colonel Urwick directs his comments forceably along this same line when he selects ethics and integrity as qualities of a manager that override skill and experience as essential to the manager's success. Colonel Urwick redirects our attention to Peter Drucker's important book, "The Practice of Management," and calls attention to Drucker's belief that integrity in the leader is the prime requisite.

This emphasis on integrity is excellent, but it carries with it something further. It is this reviewer's opinion that in the dynamic years of rapid evolution ahead of us it is not enough for our managers to be of good character—*they must be recognized for this by those they lead.* For in our society we govern by consent of the governed, and we will hold our positions of leadership only if we are trusted by our employees, by our customers, and by the general public. It will take countless acts of high integrity by managers throughout our western society to preserve to our managers their present authorities. These are under constant erosion and time could run out unless we gain and hold acceptance for our integrity of managing.

[4] President, Smithcraft Corporation, Chelsea, Mass. Mem. ASME.

Author's Closure[5]

Professor Livingstone's observations that a "progress report" may be a report that no progress has been made is, of course, accurate. It might be rendered formally as "Report of Progress—Nil." I have seen reports on endeavors to impart education to the young which, though perhaps a little less austerely, said precisely that. But surely the adoption by the ASME of the title "Ten Years' Progress in Management" did connote a certain assumption that advance had taken place. I merely wished to suggest that the generalization of this assumption had its dangers.

I accept gladly Mr. Lederer's thought that it would be better to talk of "a philosophy of *managing*" rather than "a philosophy of *management*." It coincides with a suggestion of my own elsewhere that when we talk and write of the activity we should always use the term *managing*. We should confine the more abstract term *management* to the body of knowledge about the activity.[6]

I cannot accept Professor Livingstone's suggestion that management is a function. The function is either the activity *managing* or the responsibility which is *to manage*. I would agree with him as to its universality. But in fact such measure of intelligence and control as the individual brings to the ordering of his own activities is not what we mean when we talk about managing. The term as used in American business means managing other people.

Accepting this, there are, as he points out, two headings to be considered—the things to be done and the people. But, there are also two more headings—the people considered as individuals and the people considered as members of social groups. Their behavior in these two capacities is not identical. *A* as an individual and considered in isolation will behave in one way, but as a member of this or that social group he will behave in a quite different way. It is proverbial that "there is honor even among thieves."

Strictly speaking, there can be no such thing as a "Philosophy of Management." A philosophy is a system of thought, of values, and the conduct which flows from them. An abstract idea, such as is management, cannot have a philosophy. But human beings and social groups can.

The concrete things about which we are talking are the systems of thought, the values of individuals, both of those who manage and of those who are managed. And we always have to regard them from two standpoints—*both* what they think and feel as individuals and also their thoughts and feelings as modified by their membership of various kinds of social groups, in which they react on each other and develop patterns of thought and of values characteristic of the group and of its history rather than of any one of the individuals composing it.

The insistence of Peter Drucker on integrity which is again emphasized by Mr. Newman is not a matter of personal ethics. *A* or *B* may entertain any system of ethical values and beliefs which they may select. That is their business. What those who discuss managing are concerned with is what particular system of values and beliefs will be effective in securing the co-operation of a particular kind of social group.

All that I have ventured to suggest is that, given the particular kind of social groups usually found in the free societies of the West, an individual in a position of authority will *not* secure co-operation, if he is cynical, if his system of beliefs includes the conviction that he should give first place to his own ambitions for money, position, and so on. He will secure co-operation, if his behavior convinces those responsible to him that his first thought is for the common purpose for which the system of co-operation has been established.

It may occur—it seems to have occurred in some instances in India—that some of the ethically most advanced members of a society may feel that their personal ideals are best realized by a life of contemplation. That is not to say that they are wrong. Ethically and for them personally their pattern of thought and conduct may be superior to that of others. But it is not a pattern appropriate to the task of managing economic enterprises. The task of managing involves stimulating other people to do things: its aim is action. In the scale of values of those concerned with a life of contemplation, action has a lowly position.

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[5] By L. Urwick.

[6] L. Urwick, "The Problem of Management Semantics," *California Management Review*, vol. 11, no. 3, Spring, 1960.

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Management as a Profession[1]

"Management as a profession" is a tricky topic to talk about with precision because it embraces two fundamental concepts—that is, What is management? and also, What is a profession?—plus the neat question of compatibility of the two. To do so and also talk about "Ten Years Progress From 1950 to 1960" introduces added difficulties to appraise the situation in some visualizable way, first at the start of the decade and then at its end, in such terms that the ensuing change may itself be significantly sensed.

The Management Division of The American Society of Mechanical Engineers (ASME) can appropriately assume such a task because for over seven decades it has been the pioneer forensic forum for just such fundamental discussions—the forum in which Henry Towne's timeless treatise on "The Engineer as an Economist" was presented as early as 1886; and in which Frederick W. Taylor, Henry L. Gantt, and other pioneers were making their foundational contributions more than half a century ago.

Carrying on the tradition which Harlow Person, Leon Alford, Mrs. Lillian Gilbreth, Harold Maynard, and other leaders have since established by taking stock of "Progress in Management" at the end of each decade of the Twentieth Century makes fitting that a topic still arousing such diverse views as those held on "Management as a Profession" be tested frankly in this review of the Nineteen Fifties.

Looking Forward as Well as Back

Past ASME "Ten-Year Reviews" have served a dual purpose—first to record progress made but second to define it, and in a sense so to consolidate it, as a firmer foothold from which to launch new progress in the decades ahead. This second purpose is doubly essential in a period so fluid, so characterized by *accelerating* change in almost all fields of human endeavor, as that in which the Sixties take off. Encouraging such approach, Luther Gulick—early thinker in this field, now President of the Institute of Public Administration—aptly advised:

"The value of the finding (summarizing ten years' progress in management) will be enhanced if you try to visualize the major problems of the next decade in deciding what to emphasize in the past decade" [1].[2]

Dr. Gulick listed such items as the status of the corporation in American society, political activities of corporate employees, planning as an aspect of management, labor relations, reporting and public relations, government regulation and relations, and finally, international and cross-cultural management.

The Teamwork, or Relationships, Aspects of Managerial Work

Dr. Gulick's list sharply senses what may well have been the single outstanding aspect of progress in management in the Fifties—surely setting the sights for the Sixties—namely, the growing degree to which the "relationships," or Teamwork, responsibilities and accountabilities of Managerial Work steadily became more recognized, and more consciously fulfilled, in parallel with the specific or functional characteristics of that *kind* of work.

In turn, the need to explore the concept that such work is the basis for practice of a Profession becomes correspondingly clear, since an outstanding identifying aspect of "a Profession" is precisely that it involves public interests beyond its immediate operational activities; and to such degree that those activities need to be performed with conscious, voluntary, and personally dedicated realization that their impacts have just such wide public connotations.

Complexity as a Corollary of Change

The context of "accelerating change" further connotes accelerating complexity—in work, in environment, in organization of mutual efforts of men working together in either Business or other economic and social relationships—which remains comprehensible, and indeed *manageable*, only if requisite knowledge and information (and means of creating, teaching, learning, and using such knowledge and information) can be developed essentially simultaneously.

Both the dilemma and the opportunity were well phrased by Dr. Zay Jeffries in these words:

"Our progress depends to a considerable extent on seeing to it that the simplifying processes move forward in approximate balance with the complicating processes. If this can be accomplished, then individuals with given ability can expect to go forward indefinitely without becoming casualties of their own complexities" [2].

The pertinence of this point here is that it emphasizes the need—in performing managerial work—for a second fundamental characteristic of Professional work; namely, that it be performed with understanding application of a discrete, expanding, teachable, and learnable body of organized knowledge—unique in its essential content to that particular and identifiable field of Human Work.

The Nature and the Purpose of "Professional" Work

Starting from the Gulick and Jeffries insights, both focused on current progress of managerial work in the Fifties, groundwork is laid for the premise that the "Work of a Manager"—as already widely understood and practiced today—is both identifiably unique as to its *nature*, and demandingly performable as to its *purpose*, to a degree warranting rational consideration that it does meet the two primary foundational requirements for "a

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[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

[2] Numbers in brackets designate References at end of paper.

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Profession"; namely, first, an organized body of knowledge which defines its *nature* and, second, ethical practice in using and extending that knowledge in the public as well as in personal interest, which defines its *purpose*, as such a unique kind of work.

The "nature" of the work calling for such an "organized body of knowledge" simultaneously provides the basis for a *Science*, in the dictionary's defined meaning of a Science; namely, "knowledge, as of general truths or particular facts, obtained and shown to be correct by accurate observation and thinking" [3]. And the "purpose" of the work, calling for its performance with deep personal regard for ethical—and indeed for moral—considerations provides the basis for a *Profession*, in the dictionary meaning of "a calling or vocation; especially one that requires learning and mental, rather than manual, labor—as, the profession of medicine" [3].

Transition From "Scientific" to "Professional" Managing

A long and separate treatise could easily be written on "What Is a Science?" In terms of the older "hard sciences," the so-called Physical Sciences—rooted in the idea that truth or validity is only present if measurable by the route of the reproducible physical experiment—the "organized body of knowledge" here under discussion plainly does not qualify.

But in terms of the concept that "social sciences"—or "behavioral sciences" or even "moral sciences"—can and do exist today, the term "a science" is usable here; and is so used for purposes of this Progress Report. The distinction was clearly drawn by Dr. Ordway Tead:

"We cannot develop administration as having aspects of a science as long as the nineteenth-century notion of science is still retained. We cannot have a science concerned with human dealings in all their incalculability, partial indeterminacy, spontaneous purposiveness, and limited freedom, and still use the attack of a mechanistic science in which rigid cause and effect are postulated. There has to be involved the newer organismic variety of science which has a place for purposiveness, goal-seeking, non-conditioned learning, and occasional options of free choice" [4].

Dr. Tead's position emphasizes a notable aspect of "Progress in the Fifties" with respect to "management as a profession"—which applies alike to managing in Business and also in such institutions as government agencies, universities, labor unions, and other fields of organized Human Work—namely, the increasing extent to which the earlier concept of *Scientific* Management (on which the great and now almost world-wide Management Movement of the last half century has been erected) is progressing through a transition phase toward a broader concept of *Professional* Management.

The distinction is splendidly documented by Paul F. Douglass, President of the American University in Washington, D. C., under the caption of "Scientific Management for People," in these words:

"Scientific management is something more in the development of human relations than the exercise of careful planning to achieve good performance by measurement against reasonable standards; it is a better and better way of doing things by first making better and better people. The people sustain the system; the system does not produce the people . . . . Our job is to make people; our by-product is things. . . .

"When the growth pattern of the person becomes a goal of administration, we discover that performance is related to vivid imagination of the goals of common effort and harmony in the interpersonal relationships by which those goals are achieved.

"When an organization becomes an association of persons inspired by a common objective, knit together by patterns which encourage the expression of initiative, the free use of purposeful aggression, and independence respectful toward colleagues and reverent towards the common goal, a climate comes into being which makes it possible to get work done through people. The administrator's task is to create that climate, to introduce spiritual experience into administration" [5].

Content of Concept of "Management as a Profession"

The foregoing quotation actually cites several of the concepts which are most pertinent to rational analysis of "Management as a Profession" and, by inference, indicates the mounting interest in such ideas which warrants the conclusion that there *was* great progress in the Fifties in such respects; for example, the concepts

–"*Professional Managing*" goes beyond *either* the merely mechanistic approach to leading people of which Taylor and some of his pioneer colleagues have since been accused—*unjustly* in the opinion of many solid scholars of Management progress such as CIOS Gold Medalist, Col. Lyndall Urwick of Great Britain [6]—*or* the flaccid approach of those whom Dr. Erwin Schell aptly dubbed the so-called "happy-happy" managers [7] whose workings and mouthings in the Fifties were so prominent as to provoke one observer, Dr. Malcolm MacNair of the Harvard Business School, to this somewhat pessimistic current evaluation:

> "I should . . . . like to express the view that, on balance, there has been no net progress in management during the decade of the 1950's. What has been gained in management methods, in data-processing and in organization has been more than counter-balanced, in my opinion, by the unhealthy preoccupation of management during this decade with the fad and the cult aspects of human relations" [8].

–"*Patterns*" are a factor of increasing importance in developing the scope of *Information* needed for Professional Managing in the evermore complex Industrial Society of today. They indicate the need for Managers to search for both better and better organized Information, about systems and not merely cases or incidents, as a sound basis for managerial decision-making—and indeed also for nonmanagerial decision-making [9]—at all echelons of the modern organized institution; recognizing as Dr. Norbert Wiener once put it so graphically, that

> "One of the most interesting aspects of the world is that it may be considered to be made up of patterns. A pattern is essentially an arrangement. It is characterized by the order of the elements of which it is made, rather than by the intrinsic nature of these elements. . . . [Such a pattern] will usually convey more information than the statement of isolated facts, since it also conveys interrelations" [10].

–"*Managing by Objectives*" constitutes an approach to Leadership which recognizes that when both the Manager and his associate Functional Individual Contributors are all trying to attain common purposes, rooted in common interests, voluntary initiative by all is enhanced and need for dictatorial "top-down" command is correspondingly reduced.

–Sound Managing calls for deliberate *development* of a *Managerial Climate* which makes it possible "to get work done through people." As Dr. Donald K. David succinctly put it:

> "Administration is ability so to organize that we can get the world's work done by, through and with people" [11].

–And, thus finally, the concept that "Managing" is the work of *Leading, by persuasion rather than by command*, to secure specific results through the work of other people, who themselves are acting with initiative, self-development, self-discipline, and competence, as to both their personal work and their voluntary teamwork and two-way communication, as the essence of the idea of "Professional" Managing; and also of the parallel idea just cited of organized, systematic Manager

Development activities—founded primarily on *Self*-development—which has characterized extremely widespread progress in the Fifties in both American industrial firms and in Business Schools at the universities of the United States.

–The chart on "*The Work of a Professional Manager*," which follows this page, spells out some of the foregoing ideas in considerably more detail [12].

In a deep sense such *concepts*, of course, do *not* represent *new* developments in the Fifties. Reading of the much earlier works of Dr. Lillian Gilbreth, Dr. Harry Arthur Hopf, Mr. Alvin E. Dodd, and many other Management pioneers shows that they were formulated and published from Taylor's own day onward.

The point here is that the Fifties did see an accelerating spread of understanding, acceptance, and application of such concepts as a "way of life" in daily managerial practice far beyond any such developments in earlier decades; and specifically so as a primary part of the spread of deep Decentralization in Organizing and Managing, particularly of large enterprises, which was another outstanding mark of Progress in the past ten years.

Personal Responsibility Under Real Decentralization

In passing, in so discussing the progressive Decentralization of real decision-making responsibility, particular note should appear here of one specific, but controversial, development during the Fifties; namely, the determination of some sizable companies that such positions as those of "assistant" or "assistant to" and of "co-ordinator" should be eliminated, to simplify and streamline the organization structure, on the one hand, and to pin point *personal* responsibility for both work and teamwork to specific individuals, on the other hand.

Not entirely facetiously a "co-ordinator" was said to be "a third party with a vested interest in keeping two people apart whom you are paying to work together"; and to be an added cost, which a sharp competitor does not have, hence which, at competitive prices, could only come out of profits as distinct from operating expenses.

The thinking as to "assistants" and "assistants to" dealt with more complex concepts but postulated that either for training purposes, on the one hand, or for lightening the managerial load, on the other hand, the "assistant" intermediary got exactly the wrong kind of personal training for assuming individual responsibility and risk; and that, where the Manager's load is really too heavy, the clean-cut solution is frankly to redistribute the work loads so that each individual has a scope of personal responsibility, and correspondingly measurable accountability, which is identifiably his own, both in his own eyes and in those of his associates.

There were, and still are, widely divergent views on these particular examples of "progress" in the Fifties; many companies avoiding such "progress" deliberately, others—especially many which have taken the steps involved—defending it with equal vigor. The principle was well and trenchantly set forth in the following passage by former United States Secretary of State Dean Acheson:

"The curse of leadership has always been the major-domo, the chamberlain, the chief secretary, the favorite—usually envied and disliked—who emerged from the Presence with the Word. But whose word was it?" [13].

Genuine Decentralization of Responsibility in Managing Professionally

The "new" aspect of many of the more recent applications of Decentralization in Organizing, earlier applied to secure geographic decentralization and also product or functional decentralization, is in its focus on genuine Decentralization of *Responsibility*—and especially of responsibility to exercise judgment and to make reasoned, objective, and timely decisions and at each point where personal work is done, and to do so with truly thoughtful consideration for its impacts and relationships, as well as for its technical or functional content.

In a talk on "Managerial Decision-Making" before the Society for Advancement of Management previously cited [9], the *aim* in such conscious and organized Decentralization of Decision-Making—as a fundamental element of Managing professionally—was described in these words:

"The determinant level for responsibility, and authority, to make a particular decision should be the lowest organizational level where both the needed skills and *competence*, on the one hand, and the needed *information*—embracing understanding of both direct and environmental probable *impacts* of the decision—on the other hand, *can reasonably be* brought to exist; so such understanding and information can be brought to bear in choosing wisely from among possible alternatives, or risks, as responsibility and need for decision arise."

Systematic Information as a Base for Managing Professionally

Such aim high lights another area in which notable and great "progress" has definitely been made in the Fifties; namely, in development of far better *Information* for use by Managers and, for that matter, by others in the organization also—and in the parallel growth of Information Theory for the conception and use of such better and better organized Information, on the one hand, and of electronic and other hardware and devices to aid both in getting and also in distributing and using such information, on the other hand.

This felicitous combination of developments is a striking example of the advancement of science and technology through productive professional Research in the last decade, and of the increasing understanding and use of more and more of its fruits in managerial—as distinct from technical engineering or other functional—work.

As a result, many sharp and practical observers of the current scene—such as Dr. Simon Ramo, Executive Vice President of Thompson Ramo Wooldridge Inc.—see a multiplying impact of science and technology which they believe is actually effective in "changing the nature of industry and government and, hence, in changing the nature of the problems with which management must deal and the characteristics of managers as well" [14].

Dr. Ramo, as in the case of Dr. Gulick cited earlier, also emphasizes—as another portent for Managing in the Sixties—the growing degree to which more complex and difficult relationships between business and government are becoming a vital element for managerial cons deration; and are indeed involving more complex and difficult relationships among the various segments of industry, the public, government, and international bodies.

Impacts of the "Information Revolution" on Managing

The view so potently phrased by Dr. Ramo at the end of the decade of the Fifties, reinforces a similar viewpoint set forth near the start of that period in a personal letter of April 22, 1953, to the author of this report discussion from Dr. Zay Jeffries, which contained this imaginative passage:

"The so-called industrial revolution has not merely been industrial but it constitutes a total revolution because the social and political aspects have also been profoundly changed.

"It has been too . . . . an evolution as well as a revolution and the evolution is moving in the following direction:

"1 – Multiplying human muscle output.

"2 – Multiplying human skill output.

"3 – Multiplying mental output.

"We are far along in the first phase but, naturally, this phase not completed and perhaps never will be.

"We have made a good beginning in the second phase but we ill have a very long way to go.

"We are only at the threshold of the third phase but its po-ntiality is indeed exciting.

"None of these phases will ever be completed. One of the in-resting things is the feedbacks from one phase to the other. he first phase made possible and necessary the second phase, ne second phase is going to make possible the third, and each of nem is related to the others and to the whole which becomes ıcher by virtue of having the three phases in operation simul-aneously."

Tools to Aid in Getting and Using Better Managerial Information

The kinds of increasingly technological complexities described y both Dr. Jeffries and Dr. Ramo further stress the require-nent that Managing work be based on constantly better Informa-ion; but, fortunately, with the parallel characteristic that the so-alled "technological revolution" which creates a great many of uch complexities is also constantly productive of both ideas and evices—electronic computers being, perhaps, the most striking llustration of the Fifties—to help more Professional Managers eep their needed simplifications ahead of their perplexing com-lexities.

The resultant combined and parallel *Progress* was provoca-ively posed by Dr. Ramo in these terms, in the letter cited:

"Ample attention should be given to the impact of what we . . . ave come to call 'intellectronics.' This word, which covers omething much broader than computers or automation or data-rocessing, comes from the concept of extending man's 'intellect' y 'electronics' . . . . The decade of the 1960's will probably end vith complete acceptance of the general concept that virtually very intellectual pursuit of man will be better accomplished y a partnership of man's intellect and electronics" [14].

New Aspects of "Man-Machine" Relationships

The concept of such an extension of the "*man-machine*" *rela-ionship*—which was one of the earliest fields of attention of the ıioneers of Scientific Management over half a century ago—makes harply clear (as was also emphasized by Dr. Tead) that the ıeed for clear thinking by Professional Managers is as great as ver in the parallel fields, first, of relationships with the tools they ıse to accomplish their work and, second, of relationships among ll the men who are "partners" in organized efforts to accomplish *institutional* progress basically through the continuing creativity nd productivity of *individual* men and women, whose *personal* ontribution is enhanced and not obscured because the dignity of heir labor is contributed in joint or organized efforts rather than urely individualistically.

In a scholarly talk at the first PACCIOS (Pan-American CIOS) Management Congress at Santiago, Chile, in November, 1956, Mr. Raul Saez—Chairman of the Board of ICARE, the Chilean affiliate committee of CIOS—made these trenchant re-marks:

"Closing the cycle of the idea of the importance of spiritual values of Man in the economic process, it is necessary to bring forward that management has a social role not recognized fifty years ago which today imposes itself with all the strength of a true concept: the obligation of providing a living for human beings in the best material and moral conditions possible.

"Someone has said that it is necessary 'not to forget that the man has not been created for the machine, but on the contrary, the machine for the man.'

"In a world that, almost without realizing it, is going through a second industrial revolution deeper perhaps than that which it experienced in the 19th century, in a world in which the use of atomic energy and the introduction of this curious system of production which is designated by the name 'automation' can provoke a multiplication of the productive capacity of man be-yond those limits imagined until now, it is necessary to be awake to the preservation of human values and to create again a spiritu-ality of work" [15].

The fundamental to hold in mind is that the proper role and purpose for the machine is to *multiply* human effort and work—manual or mental—not simply to eliminate it. This is as true for giant computers today as for giant turbine-generators yesterday.

This principle has itself become better appreciated as one sig-nificant result of Managerial thought in the Fifties; prompted and indeed necessitated by the ever faster pace of technological progress from ever more-organized Research, both in the physical and in the social (or behavioral or moral) sciences; with resultant ever faster development of organized new knowledge in the fields of both new and old professional disciplines. The consequences are illuminatingly envisioned by the late Dr. Sumner H. Slichter, Lamont University Professor at Harvard University:

"Today in the United States we have a large and growing new industry that may appropriately be called the industry of dis-covery. Its product is knowledge. . . . The industry of discovery is one of the most rapidly expanding industries in the economy, and it seems destined to grow rapidly for some years to come be-cause its size today is limited, not by the number of problems that are worth studying, but by the supply of skilled personnel" [16].

Research as a Source of New Professional Knowledge

Since the number of people in organized Research has itself multiplied by two and one half times in fifteen years, the impacts on, and potentials for, Managers—and no less for Educators who now are suddenly called on to contemplate, develop, and provide life-time continuing *Adult* Education on a mass scale, whereas their experience has been overwhelmingly only in providing degree courses for the younger generations—are impressive in proportion.

As a result, as more such educated and innovative people do become available in the economy, the capacity both to increase productivity and to increase demand for goods continues to rise. As Dr. Slichter concluded:

"Growing capacity to make technological discoveries makes it less necessary for enterprises to take markets as they find them and improves the ability of enterprises to operate upon markets by offering consumers goods that they are ready to buy even at the cost of going in debt and by offering other enterprises equip-ment that they cannot afford to be without."

Both the challenges and the opportunities for Managing to bring about, and to benefit by, Automation follow naturally from the growth of such new "industry of discovery."

And it is significant to think about Slichter's comment in the same article that, "The art of management *has* [emphasis sup-plied] developed enormously in the last 50 years and is still de-veloping," in the context of Urwick's quotation—in his 1957 CIOS Paris lecture on Taylor, previously cited—of Taylor's comment in his famous ASME paper on Shop Management in 1903, over "fifty years" earlier, that

"Management will be studied as an art and will rest upon well-recognized, clearly defined and fixed principles instead of depend-ing upon more or less hazy ideas received from a limited observa-tion of the few organizations with which the individual may have come in contact" [17].

It is similarly pertinent that Taylor—as was further noted in the Urwick lecture—recognized as early as in his ASME paper on

TH

- By *Persuasion* rather than by Command*; and by *blending thought and action in decision-making*
- Through *Planning, Organizing, Integrating* and *Measuring* – as the elements of the dynamic *Work of a Professional Manager*
- In the balanced and effective *use of* all *the Human and Material Resources*
- Of the *particular component, or* of the *whole enterprise*, being managed,

PLANNING

1. Determining Objectives

- Making sharp, clear analyses of past and present trends
- Thinking ahead–making sound, practical forecasts
- Anticipating, rather than merely forecasting; so as to make and not simply meet the next situation; with perception, imagination, courage and faith; looking to the future hopefully, constructively and creatively; combining originality and boldness with capacity for thinking clearly under pressure so as to take full advantage of all opportunities and avoid costly mistakes
- Choosing the best from possible alternatives, considering both long and short-range advantages and disadvantages
- Selecting and stating optimistic, difficult goals, for the component, or the whole enterprise being managed, in terms both of service to be rendered and profits to be earned and of the inseparable relationships between them
- Avoiding confusion, rigidity, stagnation; accepting change, flexibility and progress; and looking to the future creatively and constructively

2. Establishing Policies

- Developing, formulating and affirming sound policies; reflecting broad understanding of human values and keeping good perspective and balance between long and short-range goals, as well as between each job and component and the whole enterprise being managed
- Determining priorities and maintaining realistic balance among specific objectives, recognizing that conflicts among over-all interests are normal from time to time
- Anticipating obstacles or difficulties to be encountered, and requiring persistence and confidence in selecting best practical steps to overcome them
- Expecting high standards of performance from self and all associates
- Expressing Policies–and their factual background–so as to secure acceptance loyally within, and understandingly without, the component, or enterprise, being managed

3. Formulating Plans (Including Schedules); and Standards of Performance

- Finding the right way by orderly Research, a factual approach and by analyzing problems resourcefully, intelligently and aggressively; assembling and presenting adequate facts so that they may be available to all concerned, in advance, as a basis for making reasoned decisions–coolly, impersonally, objectively
- Selecting and stating tasks to accomplish objectives
- Determining programs, including time schedules; and developing patterns of objectives and work of the business which are clear enough to facilitate accurate visualization and understanding participation by all employees
- Expressing programs in budgets for
  - Manpower–managerial, other professional and other
  - Facilities and equipment
  - Operations–sales and income, outgo and expenses, net profit and return on investments
  - Cash and financing, including new money required
- Making definite development plans for individual managerial, professional and other associates
- Developing and expressing factors, units and standards for measuring performance, of individuals and of components; establishing valid criteria to assess significance of accomplishment and growth

4. Making Known the Objectives, Policies, Plans and Standards

- To all those involved or concerned with their performance

5. Using Results of Measuring to Readjust Continually the Work of Planning.

- Of objectives, policies, plans, schedules and standards

6. Exercising Judgment and Making Reasoned, Objective and Timely Decisions To Effectuate the Planning Work and Progress

- Taking reasonable risks confidently, competitively, courageously and on own responsibility, on basis of facts available, choosing wisely from among possible alternatives as responsibility and need for decision arise

ORGANIZING

1. Determining and Classifying Work Required and Dividing It into Manageable Components and Jobs

- Determining total work necessary to accomplish plans and programs within of designated objectives and policies
- Classifying total work into primary constituent kinds of work–Research Manufacturing, Marketing, Financial, Employee & Public Relations, Lega (and Operations Research & Synthesis, where applicable) and Managerial; respective sub-functions–as applicable
- Dividing the work as so classified into manageable components, positions an
- Combining the work to be done with facilities necessary for its performa best channels for coordinated application of available effort

2. Grouping Components and Jobs Into an Orderly Organization Struc

- Grouping like work together into an orderly pattern or structure of distinct organization components and of individual positions or jobs within compon and natural Relationships to other work
- Making effective use of all resources of the business needed to accomplish each component and of the enterprise as a whole
- Defining salary and wage structure for all positions and jobs
- Defining Responsibility and Accountability for performance and relation position or job, commensurate with Authority assigned or delegated to such
- Specifically stating as to each job–in kind and in dollar or other number li Authorities, in accordance with written Policies, for each position or job
- Using such reservations and policies as means for expressing owner interest guide rules within which each Manager or other employee may exercise fre performing his own work in the balanced best interests of the component prise as a whole

3. Selecting Individuals for Designated Positions and Jobs

- Specifying personal characteristics, skills and knowledge, and actions to b man to perform the work of each job
- Selecting an individual–from the component, the enterprise as a whole or fill each job who is well qualified by the test of such candidate-specifications; the organization structure to use the talents of individuals most logically and
- Finding what men do well rather than what they do badly, so as to fit round holes with sympathy and understanding
- Removing, after appraisal against performance standards and after proper d the man, any individual who is inadequate either in performance or in compat

4. Formulating and Defining Methods & Procedures for Performing Work

- Seeking and describing the simplest and best way to do each task or kind of wo those kinds which are repetitive, so that all work may be accomplished easily, economically, systematically and understandably
- Conducting analyses and studies (including appropriate Operational Research terns of order in work and relationships which will facilitate understanding, tion and economy of money and energy in performing all necessary work with ductivity rather than greatest intensity of effort

5. Organizing Manager's Own Work and Time

- Securing maximum balance and effectiveness in own efforts and in use of o working hours

6. Making Known the Organization Pattern, Staffing and Methods and

- So Manager and associates can perform as an effective, cooperative team
- Specifying the need for common sense and good judgment so that contacts, information, between people and components are carried out in the simplest and way practicable for prompt, effective handling of all Company work
- Noting that the organization structure indicates channels for flow of autho decision-making responsibility but not for such free flow of contacts and with each man expected to communicate to his manager and his associates a fully as they are expected to communicate to him

7. Using Results of Measuring to Readjust Continually the Work of Organi

8. Exercising Judgment and Making Reasoned, Objective and Timely Decis To Effectuate the Organizing Work and Progress

- Taking reasonable risks confidently, competitively, courageously and on own re on basis of facts available, choosing wisely from among possible alternatives bility and need for decision arise

To achieve successfully, economi
in the balanced best interes

*It is recognized that there may be emergency conditions, where Persuasion has failed, and results of continued effort at Persuasion–in the judgment of the Manager–would be worse than temporary use of "Command" to get on with the job. In so doing the Manager is acknowledging temporary failure as a "Professional Manager", and hence resorts to such course as an expedient only and takes requisite steps to identify and correct the root causes of the failure in order to prevent subsequent similar failures.

THE WORK OF A PROFESSIONAL MANAGER

MANAGING, as a distinct and a professional kind of work; namely, **LEADING**

…ught and action in deci-

… as the elements of the

…ial Resources
…g managed,

- With due *understanding* and *balanced application of* the *skills* and *knowledge* required to manage its *particular* activities or operations;
- With best *pace,* synchronized *flow, timing* and *turnover;* all
- To secure balanced *Results* through the specific *Work*—Research & Engineering, Manufacturing, Marketing, Financial, Employee & Public Relations, Legal & Corporate, (and Operations Research & Synthesis, where applicable) or Managerial—of *Other People,* who themselves are also

- *Acting with initiative,* … their *personal work and*
- Seeing the *individual jo* … imaginatively and in *tr*
- Consistent with the cu… environment, or "socie…

…ZING

…d and
…nd Jobs

…h plans and programs within the framework

…nt kinds of work—Research & Engineering, …ee & Public Relations, Legal & Corporate …applicable) and Managerial; and into their

…able components, positions and jobs
…s necessary for its performance to provide …ailable effort

…Orderly Organization Structure

…attern or structure of distinct and dissimilar …sitions or jobs within components in proper

…usiness needed to accomplish objectives of …e
…tions and jobs
…or performance and relationships of each … assigned or delegated to such job
… in dollar or other number limits—Reserved …, for each position or job
… for expressing owner interests in terms of …er employee may exercise free initiative in … interests of the component and the enter-

…ns and Jobs

… knowledge, and actions to be required of

… the enterprise as a whole or elsewhere—to … such candidate-specifications; thus manning … individuals most logically and effectively
…y do badly, so as to fit round pegs in round

… standards and after proper discussion with …r in performance or in compatibility

…dures for Performing Work to be Done

…y to do each task or kind of work, especially … work may be accomplished most quickly, …tandably
…propriate Operational Research) to find pat… will facilitate understanding, communica…orming all necessary work with greatest pro…

…n own efforts and in use of own available

… Staffing and Methods and Procedures

…ffective, cooperative team
…od judgment so that contacts, and flow of …e carried out in the simplest and most direct … of all Company work
…es channels for flow of authority and of …h free flow of contacts and information; …s manager and his associates as fairly and …im

…tinually the Work of Organizing

… Objective and Timely Decisions
…gress

…ly, courageously and on own responsibility, …m among possible alternatives as responsi-

INTEGRATING

1. Interpreting and Making Understood the Planning, Organizing, Integrating and Measuring Elements of the Dynamic Work of a Professional Manager

- Showing the common purpose which integrates all activities and all components of the enterprise and which makes an organic whole of the enterprise, all of whose parts must function and grow in balanced accord
- Interpreting Company and Component objectives, policies and plans and explaining the work and responsibilities of others
- Explaining to each individual, his assigned portion of work and the relation of his work to the total work of the component and of the Company

2. Listening; Facilitating Full Frank Communication to the Manager

- Keeping close contact with, and making optimum use of, ideas of employees, associates, customers, suppliers, public, including the public's representatives, Government
- Giving men the "Right to be Heard", with open-minded patience and tolerance for objections and differing opinions
- Consulting men before making plans or decisions which affect them
- Having consideration for and regarding human values as precious assets worthy of preservation and development

3. Obtaining Sincere, Voluntary Acceptance of Work Assignments, Responsibility Relationships and Accountability from Individuals

- Inspiring willingness, freely expressed, to perform work and team-work within the determined organization pattern and relationships
- Obtaining from each individual voluntary acceptance of the responsibilities and commensurate accountabilities that go with his work assignment
- Or arranging for the transfer of the individual to another type of work for which he is better fitted and has more interest, in or out of the component or enterprise, being managed
- In accomplishing the above, listening for, being sensitive to and understanding the individual's desires, objectives, feelings, ideas, suggestions; and seeing if, and how, these are consistent with the common purpose of the enterprise as a whole

4. Creating and Maintaining a Friendly, Cooperative, Dynamic and Productive Working Climate

- Engendering high morale and fostering continuing individual and team productivity
- Encouraging, stimulating and inspiring thoughtfulness, initiative and individual productivity rather than demanding only intensity of work
- Expecting men to recommend decisions rather than merely ask for decisions; and to bring wrong decisions back for review and correction instead of merely complying blindly
- Teaching, coaching, advising and counseling as to means for individual self-improvement and best known ways of doing the necessary work
- Delegating responsibility and authority genuinely and continually
- Making sure that work is rewarded by recognition, status and compensation in accordance with accomplishments
- Representing and supporting the men who report to him strongly and well
- Basing decisions on established principles, facts and the "Authority of Knowledge," rather than on position, rank or expediency
- Deserving and earning the respect of associates because of actions as well as words and because of his own integrity, ability and consideration of others
- Settling differences by finding a better way, not by *Domination* (in which one gets victory over another—temporarily at least) or by *Compromise* (in which neither gives nor gets all and neither is satisfied) but by Integrating,

…inventing anoth… this being one … of the hardest

5. Encouraging In…

- Carefully appr… gesting on-the-j… cussing apprais… manner
- Holding each … self-appraisal, s… ment; thus hel… and release his…
- Teaching men … ership ability …
- Challenging ot… achievement

6. Relating the In… His Component… the Industry, th…

- Knowing and … living of all … the Nation
- Making and e… and effort to t… and economic … work of Profe…
- Realizing need… tively to the g… and World
- Recognizing t… principle of m…
- Being willing … lower unit pri…

7. Achieving Succ… Integrated Per…

- Delving into s…
- Reuniting, har… which were di…
- Getting integr… turnover
- Utilizing all h… good balance …
- Carrying out … Company in lo… employees, sup… the Governme…

8. Making Known…

9. Using Results … To Readjust C…

10. Exercising Jud… Timely Decisio…

- Taking reason… own responsib… possible alter…

TO ACCOMPLISH DESIRED PERFORMANCE AND RESULTS; namely

To achieve successfully, economically, profitably and on time, challenging and difficult-to-attain objectives of the component, and of the enterprise as a whole, in the balanced best interests of Customers, Share Owners, Employees, Suppliers, and the Public, including the Public's Representatives, the Government.

ative, self-development, self-discipline and competence, as to both
rk and their *voluntary team-work, and two-way communication;* each
dual job and its *relationships* to the whole component, and enterprise,
d in *true perspective*
he current and potential *economic, social and political "climate"* (or
"society") of the component or enterprise being managed

another way of serving the best purposes and interests of all;
one of the most important elements of a manager's job—and one
rdest

ng Individual Self-Development

appraising each individual's strengths and weaknesses, sug-
n-the-job and off-the-job plans for self-development and by dis-
appraisals and self-improvement plans in a frank and friendly

each man to high standards of performance and encouraging
aisal, self-discipline, self-control, self-motivation and self-improve-
us helping each man to accomplish his own personal objectives
se his own best efforts

men that the Work of Managing can be learned and that Lead-
ility can be developed

ing others to do their best and thus leading them to greatest
nent

the Interests of the Individual,
onent and the Company to the Interests of
try, the Community, the Nation and the World

and explaining how our industrial society raises the standard of
all citizens and provides social benefits to the community and
on

and encouraging others to make reasonable contributions of time
rt to the work of outside groups whose purpose is general social
nomic growth and improvement in the theory and practice of the
Professional Managers

need to fit behavior of the enterprise constructively and imagina-
the general economic and social progress of community, Nation
rld

zing the "Sovereignty of the People" as the great legitimatizing
e of modern politics and government

illing to grow; to deliver more and better service at constantly
nit prices in terms of currency of stable value

g Successful, Economical, Profitable,
d Performance by All Individuals and Components

into snarls and untangling them successfully and profitably

g, harmonizing, synchronizing and blending the portions of work
ere divided and assigned in Planning and Organizing

integrated and balanced results with good pace, flow, timing and
r

g all human and natural resources of the business well and in
lance

g out objectives, policies and plans of the component and of the
ny in long and short-term best interests of customers, share owners,
ees, suppliers and the public, including the public's representatives,
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Known the Integrating Concept and Work

sults of Measuring
just Continually the Work of Integrating

g Judgment and Making Reasoned, Objective and
Decisions To Effectuate the Integrating Work and Progress

reasonable risks confidently, competitively, courageously and on
sponsibility, on basis of facts available, choosing wisely from among
e alternatives as responsibility and need for decision arise

ole,

MEASURING

1. Devising and Establishing Measuring Systems and Media

- Creating and effectuating Measuring Systems and Media for orderly recording and reporting of Measurement facts, information, statistics and accounts
- Giving specific attention to need and ways to Measure Operating (including income, cost and profit), Functional and Managerial performance—both long and short range—for all Key Areas to which managerial attention needs to be guided to develop strengths and eliminate weaknesses; and to improve current and future Planning, Organizing, Integrating and Measuring; continually using a Research approach to find a new and better way

2. Recording and Reporting Performance of People and of Components

- Recording actual performance—of people and of components—in form comparable with the factors and units determined as Standards for Measuring such work and results
- Reporting recorded results promptly and understandably
- Transforming detail information as rapidly as possible into condensed Measuring facts, comparisons and variances as it moves upward in the organizational structure; thus making it possible for Managers to function, and to deserve respect, through authority of knowledge rather than authority of position

3. Analyzing, Appraising, and Interpreting Measured Results

- Analyzing data and comparisons of plans and performance with opportunities
- Comparing performance and results with Plans, including schedules, and with Standards
- Determining both basic performance and also deviations (or variances) from Standards
- Analyzing data and comparisons of performance with Standards
- Formulating and interpreting results of such analyses to indicate actual or probable causes for results and variances wherever possible
- Making facts, comparisons, analyses and interpretations available quickly and clearly to those responsible for performance and for taking any actions required in the light of such Measuring work; and especially so that adequate facts may be available to all concerned, in advance, as a basis for making reasoned decisions on such facts rather than on opinions, so far as feasible and practicable

4. Making Known the Measuring Systems, Media and Results

- To all whose performance is Measured or who can use results of the Measuring process for better understanding, planning and performance of their own work

5. Using Results of Measuring to Readjust Continually the Work of Measuring

- Improving Measuring systems and media and their use continually to keep managerial Planning, Organizing, Integrating current with the dynamic progress, needs and potentials of each component and of the enterprise as a whole
- Using the Measuring work and process as a "feed-back" for continual reappraisal and readjustment of the entire work, and performance

6. Exercising Judgment and Making Reasoned, Objective and Timely Decisions to Effectuate the Measuring Work and Progress

- Taking reasonable risks confidently, competitively, courageously and on own responsibility, on basis of facts available, choosing wisely from among possible alternatives as responsibility and need for decision arise

"The Principles of Scientific Management" in 1911 that "in an industrial democracy the producer and the consumer are the same person."

Requirements of an Industrial Economy for Professional Managing

In a great many ways questions about "Management as a Profession" root in one of the growing and increasingly recognized characteristics of the modern Industrial Economy; namely, the developing separation in fact of ownership and of managing in different personnel. A whole literature is building up on this subject—accelerated initially by conditions during the Great Depression of the 1930's—which space and pertinency forbid detailing in this paper.

Nevertheless, when the "owner" personally exercised both proprietorship authority and managerial responsibility, his actions usually had a broad public acceptance and *legitimacy*—if only because his own capital was known to be totally at stake and his mortal tenure, for good or mischief, had understandable limits—which does not pass as an automatic inheritance to the "manager" in the typical large modern industrial organization today.

While legally and as a factual matter of continuing corporate operation, the "manager" continues to be the representative of the owners, he is typically chosen or appointed either by a board of directors, sometimes self-perpetuating, or by a higher echelon "manager" rather than "elected" in the sense in which holders of political office are, in the eye of the public, validly franchised through competitive periodic open elections.

Whereas the resulting practical situation brings demands that today's "manager" act in "the balanced best interest" of customers, owners, employees, vendors, distributors, the public—and the public's representative, government—the legalistic base of managerial appointment, removal and action stems from procedures in which only the owners of shares of corporate stock customarily have voting participation.

Reliance upon "authority"—or sheer power—as a basis for guiding or directing the aims and actions of a large, diversified organization under such circumstances brings scrutiny and demands for either participation from the other groupings of people vitally affected by the operations involved or for more intimate public or governmental intervention, regulation, or even substitution in such managerial work.

It is, in large measure, to solve precisely this characteristic dilemma of the modern Industrial Society that the concept that Managers act *professionally* has, no doubt, its greatest pertinence. This concept recognizes the basic legal and economic purpose of the corporate business enterprise—that of making profits—while at the same time necessarily considering also the manifold and sometimes conflicting interests which must be reconciled in attaining that goal.

Public Scrutiny and Certification of "Professions"

Yet it is typical of "professions" that, at some point—certainly *not* foreseeable at this time with respect to the work of business Managers, as such—a public qualification for practice, especially where public health or safety is clearly at stake, is imposed, which usually involves some governmental certification procedure that sets at least minimum standards for professional competence and conduct.

The mere idea that individual opportunity to "go into business"—to risk one's own, or to attract other, efforts and capital and resources in venturing for profit or loss—even *might* ever require advance governmental permission instinctively raises quick personal reactions; often with deep feeling that any such future approach might easily reverse the historic rise of production, productivity, and progress which has characterized competitive enterprise in a free market economy.

Business Opportunity in Today's Industrial Society

Statistics of the National Industrial Conference Board indicate that in the mid-1950's there were of the order of 4,500,000 business firms of all types in operation in the United States; that well under 20 per cent of those—or some 885,000 firms—functioned as corporations; and that only about 8,500, or less than 1 per cent, of such corporations had total assets of $10,000,000 or more.

Other statistics from the same source show that of approximately 64,000,000 individuals in civilian employment, in 1958, only about 42 per cent were in "white collar" occupations—with 37 per cent in manual work, 12 per cent in service trades, and 9 per cent on farms; and that among the "white collar" individuals, about 6,700,000 or some 10.5 per cent of the grand total, were "managers, officials, and proprietors, excluding farm" while about 10.8 per cent, or roughly 6,900,000, were in "professional, technical, and kindred" work.

Such figures, although only approximate, make plain that the overwhelming majority, in number, of business establishments are still small, still typically unincorporated; and consequently that no dearth of opportunity—or inclination—to set up personal, or personally controlled, business ventures is visible in the American economy. Whether, even in such "small business" firms, more "professional" managing might improve rather than hinder progress and profits is an area in which much more "management" study and research in the Sixties is definitely worth while.

However, the other side of the picture is that a highly substantial volume of the total business of the nation is, in fact, carried on—and a sizable proportion of work opportunities are situated—in the operations of the comparatively smaller number of firms which do conduct large-volume sales and operating activities. And since it is these corporations whose operations do increasingly affect larger numbers of customers, investors, and employees, it is here that the concept of "professional managing" is most pertinent; and most under review and consideration.

Balancing Authority With Responsibility by Managing Professionally

The business and economic literature of the 1950's abounds in analyses of the political—as well as the economic, technological, and social—relationships surrounding such large business organizations. The catch phrase "Power Without Property" crisply conjures up one line of mental analysis pervading much such writing. And, as might naturally be expected, suggestions for "checks and balances" and for "countervailing power," similar to conventional approaches for limiting or offsetting excessive sovereign or governmental power, are a not unnatural current by-product of such mental excursions.

Again, one plainly inviting and desirable field for perceptive management Research in the 1960's is in precisely this area; lest "cures" adapted from bureaucratic governmental experience also bring the diseases of bureaucracy into the competitive enterprise sector of the total economy, with possible results in curbing desirable initiative, innovation, risk-taking, and motivation to personal venturesomeness that easily might be more harmful to continued industrial and economic progress, creativity, and productivity than the workings of the "power" characteristics sought to be curbed "in the public interest."

Nevertheless, the size, complexity, and scope of operations of today's large corporate enterprises is of a really different order of magnitude than even the large-scale operations of an individual proprietor, upon whose assumed motivations and actions today's

classic Economic Theory still rests. This suggests a field both for *new* and up-dated theory in that area in the 1960's and also for investigation whether a new and different set of roles and relationships for both those conducting and those affected by the functioning of such large corporations affords a similarly fruitful field for future research.

The power—especially the potential power—of those actually directing the large corporation's affairs, to influence both strongly and lastingly the rights, interests, and relationships of all the "classes" of persons interlinked operationally with such a large corporation, obviously calls for constant recognition, examination, and validation, with the mutual "rights" of all involved fairly considered and treated.

Legitimacy of Power as a Managerial Dilemma

The manager's "dilemma" is that, if he is to achieve legitimacy in the eyes of the classes so affected, to be sensitive to their interests in competitive and often controversial situations, some essentially new foundation for acceptance by them of his working approaches is correspondingly desirable. For if he is *not* accepted *by them*—at least de facto—how acceptable is any power he purports to have or exercise in that capacity or interest?

The trend to legitimatize such working relationships through the concept of "Management as a Profession" seems, to many thoughtful observers, the most hopeful approach now discernible as potentially practical. This approach takes the form—in accordance with precisely that concept—of specifically voluntary action by corporate managers to describe and conduct their work as that of "professional managers." Both the interest and the progress in this concept in the Fifties show increasing recognition of such trend.

In so acting voluntarily as "professionals," in sensing the "balanced best interests" of all the classes of individuals in contact with profit-seeking, and earning corporate operations—and so not *solely* in the tenor of the classic economic "proprietor"—managers find it progressively mandatory to do so with concrete recognition that a "profession" calls, in parallel, for its own unique and organized body of knowledge as to the distinct work covered and also for a code of ethics, with morally acceptable base, in performing such work, both within the enterprise and in external contacts and relationships.

Legal Recognition of Managers as "Professionals"

Whether, under such circumstances, the day may come when some specified categories of men so acting as "professional managers" may be called on, in the public interest, to qualify as possessing some minimum qualifications of competence and attitude to do so, and to be governmentally certified accordingly, is clearly not an imminent likelihood for the decade of the Sixties; but is, quite possibly, not at all an impossible development for the longer future.

Even so, since tens of thousands of responsible corporate employees—in positions of great functional leadership responsibility—already hold similar certificates as professional engineers, accountants, lawyers, and so on, and do not find their business working relationships or capacities adversely affected because of such condition, it seems more of an academic, or even an emotional, "problem" to contemplate some corresponding arrangement for some "professional managers," rather than an eventually more serious issue.

The mere potential, however, indicates the high desirability for ever closer voluntary integration of the efforts of *professional* Functional Individual Contributors and of *professional* Managers in a real *"Legion of Leadership"* for mutual ascertainment and development of the best objectives and best operational progress of the modern corporation in the public interest and in their own mutual interests and in the common interest of all other employees of the enterprise, alike.

"Bigness" as Both Bogey and Challenge

Realistically, the operational situation of managers in large corporate enterprises does continue to get more complex; and the growing body of literature earlier mentioned bears public testimony to the facts in this respect. So the heretofore quite freely accorded public "legitimacy" of the managers of such corporations calls for constructive study, understanding, clarification, and validation accordingly.

"Bigness" today, and for tomorrow, is more than a bogey-man. It is real. It is here to stay; it is a political, social, technological, and economic necessity. Courses of action founded in hopes to have it either go away or revert to some static status make progressively less sense. The true need—especially for one who aspires to cope with its opportunities and requirements by becoming a "professional manager"—is to recognize its reality, and its trends, factually; and then both voluntarily to act professionally in the present, and to be sensitive to trends for the future, especially in development of the legal framework, if necessary.

This is the historic role of statutory law, to reduce the accepted customs and functioning of the people of the community to clear, understandable, acceptable public status—enforced by public opinion and enforceable by the "police power" of the community, if necessary.

Managing Professionally in "Top Executive" Echelons

The need for corporate managers themselves to come to intellectual grips with such realities of their work seems high, and growing. Especially in large corporations, this need calls clearly for more of the hours and talents of corporate-level executives, or "top executives" in today's vernacular; and at the same time for delegating and decentralizing responsibilities for many current operational decisions—which have in the past occupied the time of such executives—to managers and other workers at other echelons of the organizational structure. This need, incidentally, has already been publicly stressed by some penetrating students of "management as a profession," as well typified by some comments of Dr. Peter F. Drucker quoted later in this report discussion.

The important point to keep firmly in mind *now* is that if "Management's" *old* ideas of Capitalism increasingly do not fully portray reality, as to today's "capitalism," it does not at all follow that the principles of *Freedom* cannot be maintained. They are—and will continue to be—*more* needed in an era when the State (as well as the corporation) is larger, more complex and in more intimate relationship with enterprise, and with "capitalism."

Effect of Dual Corporate and "Professional" Responsibilities

One aspect of professionalism which will undoubtedly become pertinent in the Sixties for the Professional Manager—as it already has in the Fifties, in the case of the professional Physical Scientist or Professional Engineer, for instance—is the duality of loyalties and responsibilities of the true "professional" to his profession, on the one hand, and to the economic organization which he serves for pay, with both Work and Teamwork responsibilities and accountabilities as a consequence, on the other hand.

The kind of stresses involved, incidentally, are not unduly different *in kind* from the dual tug of the company and the union on the nonprofessional employee who is also a member of a labor union.

Many "common interests" tend to unite the two loyalties. Certain diverse interests—for instance, the right or absence of right to publish new contributions to knowledge at a time of the

working individual's choosing when significant competitive or profit points are germane—tend to divide them.

In the nonmanagerial field, in the 1950's, a resultant "schism" between growing numbers of professional employees in an increasing number of professional disciplines—from engineers to lawyers and so on—and the organizational entities in which they work, has become the subject of far-flung discussion; well summarized in the 1959 Rede Lecture at Cambridge University by C. P. Snow, subsequently published as a book called "The Two Cultures and the Scientific Revolution" [18].

In an even broader sense, a similar "schism" between such economic entities and the greater social and political community and culture in which they thrive, has likewise come to extensive public consciousness.

It is clearly to be anticipated that as the future Managers in business enterprises themselves become genuinely "professionals," *as managers*, they will face the same basic issue with respect to personal loyalties to both Company and profession as do scientists or union workers already.

Hopefully, here, the "*Integrating*" concept and principles—outlined in some detail on the chart of "The Work of a Professional Manager"—is deliberately designed to cope positively with precisely such matters; and such a work element is as specifically pertinent in defining the "Work of a Functional Individual Contributor," or that of the nonmanager (whether professional or nonprofessional), as for the work of managers.

Basically, again, it is in perceptively sensing common interests, developing related common purposes, and then thinking and acting voluntarily to pursue such common objectives to the greatest feasible degree, that the path to mutually acceptable progress and continued personal Freedom—especially for "professionals" —seems most hopefully to unfold for the Sixties.

Managing to Keep Freedom Amidst Complexity

Progress in the Fifties, and goals for the Sixties, of both "Manageability Research" and of the "Work of a Professional Manager" key heavily to keeping the fundamental requirement to preserve *Freedom*—through continued usability of eternal principles, but for application under ever new and changed circumstances—deeply in mind and heart.

Actually, the limits of human ingenuity—especially to function in today's modern, complex, industrial organizations—are not, in this author's judgment, yet seriously stretched.

Our capacity to have even bigger and more complex organizations for more difficult economic, technological, social, and political achievements, is still *not* at any foreseeable limit.

What is significant, however, from this viewpoint, is that if we are to continue such growth more of us will need to give up either doing, or even advocating and relying upon others doing, the familiar practices achieved out of past individual work experience; precisely as Taylor foresaw was necessary over fifty years ago.

In turn, we will need consciously to put our time and talents into groping—even with repeated discouragement and confusion—into the areas where affairs and situations and trends and relationships are still most unclear; and hence most prospectively necessary to imagine, to anticipate, and to shape—rather than merely to adapt to expediently as circumstances unfold and impinge.

The resultant requirements for the "Professional Manager" are both challenging and inspiring in proportion to such complex needs. In Paris, in June, 1957, at the Eleventh CIOS Congress on Management, under the distinguished chairmanship of CIOS President Count Pierre Baruzy, a stimulating address on "The Character of the Businessman" [19] by Mr. Henry R. Luce, Editor-in-Chief of Time, Inc., focused the minds of the 1,800 businessmen there in attendance from thirty-five countries on precisely such basic questions; namely, "How much foresight, honesty, courage reside in the businessman? Enough to bring about the Age of Abundance?"

Mr. Luce, in those provocative yet encouraging remarks at Paris, called finally for just two virtues—the *first*, honesty, just old-fashioned personal honesty but necessarily broadened in concept in our time to encompass what he called "the radical doctrine . . . . that all business is invested with a public interest"; and *second*, courage—the courage of the businessman's convictions—as he put it "a belief, that is, that business is an honorable occupation, and that the best way to develop wealth and to spread it is through business." And, as he then went on,

"Starting with your natural belief in business, in honest business, in the business of the free market, there is no doubt whatever that you will find that you are also the true believer in the great liberal tradition of the Western World, which is summarized in one phrase—Liberty under Law. That is the great tradition that today requires the profound allegiance of us all."

Mr. Luce's closing words quoted from Ralph Waldo Emerson's famous essay on Self-Reliance, that "Nothing can bring you peace but yourself. Nothing can bring you peace but the triumph of principles."

Surely the simple fact that such a message should be given, and received, as the keynote of one of the greatest, world-wide Management meetings of the Fifties is itself solid evidence of the healthy progress toward "Management as a Profession," which cropped up repeatedly in many forms, and in many countries, in the tumultuous decade covered by this "Ten-Years' Progress in Management" report.

World-Wide Progress of Organized "Management Movement"

Further specific note should be made of the extent to which, in the 1950's, the organized "Management Movement" made accelerating progress both in the already highly industrialized countries and in other parts of the World.

The phenomenal growth of the American Management Association in the United States, for example, under the dedicated guidance of its President Lawrence A. Appley, was inspiring both in itself and in the degree to which it helped generate similar association efforts to promote more professional management in Europe, in Latin America, Africa, and in the Far East and Indo-Pacific areas.

It is further significant that in this decade the Comité International de l'Organisation Scientifique (CIOS) grew to have affiliate societies in over thirty nations and reorganized and decentralized to set up "Regional CIOS" bodies in Pan America, Europe, and the Indo-Pacific fields. The Xth Management Congress of CIOS was held in Latin America for the first time in São Paulo, Brazil, in February, 1954, under the guidance of the late Brazilian leader, Dr. Moacyr E. Alvaro; and CIOS' XIIth Congress was held in February, 1960, in Australia, in the Far East for the first time, under the aggressive leadership of Mr. Walter D. Scott of that country.

Such international groping for discovery, establishment, and practice of a specific discipline for the work of a "Professional Manager" was characterized by similar multiplied effort—and combined student and faculty participation—in undergraduate, graduate, and adult *education* efforts in the universities; as well as in special adult courses and programs in more and more industrial and commercial corporations during the 1950's.

Defining the Work of a "Professional" Manager

It is an interesting contemporaneous development that attempts to *define* the work and attributes of "*Professional* Managers" grew apace with such activity.

While no one "definition" acquired universal acceptance, a typical approach may be cited here—which Colonel Urwick, writing in a private letter in December, 1956, on "the evolving understanding of the obligations and ideals of the most progressive type of modern executive," described by saying: "This [passage] seems to me to summarize the basic ideas of the professional approach to Management and their difference from the old freebooter and tycoon concept of the Management function better than almost any paragraphs I have ever read." The passage, by President Ralph J. Cordiner of General Electric Company, reads:

"The work of managing is tending to become professional, as a distinct kind of work in itself. It's becoming a job that requires a great amount of specialized thought, effort, and training in the principles as well as the techniques of managing. For the manager has the challenging task of getting results through the work of other men and women, rather than directly by his own effort.

"The professional approach requires, in fact, a dedication of the man's self and service not only to the owners of the business through his Board of Directors, but also as a steward to the Company's customers, its industry, its employees and to the community at large. The professional manager must consciously place the balanced best interests of those ahead of his own personal interests. The corporate manager today thus has an opportunity and an obligation for service comparable to the highest traditions of any professions in the past" [20].

"Common Purposes" as Foundation for Professional Managing

In remarks of the author of this paper on "The Changing Structure of Management" at an ASME panel discussion of December 3, 1952, to review the "Ten Year Progress Report of the Management Division" for the preceding decade of the Nineteen Forties, the fundamental points were postulated that,

"Building the economy (and the Plans, Policies, and Objectives of its enterprises) on the Customer, and hence on the Free Market, gives the Managers of the resultant enterprises that genuine legitimacy which flows from the *Common Purposes* of the Leaders and the Followers. . . ."; and that

"In this sense 'Management' becomes truly a profession, built on a genuinely factual and scientific base. It becomes, therefore, a distinct kind of work from the other functional kinds of work of a business such as research and engineering, manufacturing, marketing, financial and accounting, public and employee relations and legal work.

"Yet it is integrated with them to the twin ends that the efforts of all individuals in the enterprise may be smoothly blended with each other, and also that the enterprise itself may be integrated harmoniously into the Society of which it is a part."

The "prophet" confronted with his own prophecy, now a decade later, is, perhaps, less than the most reliable witness to comment on its fulfillment. Resort is, therefore, useful to the views of more impartial observers.

Concensus of Comments of Management Leaders

This accordingly marks an appropriate spot to offer the summarized views, in this respect, of diverse managerial leaders who wrote on this subject in the 1950's or who supplied comment on the topic "Management as a Profession" to the Co-Editors of this Ten-Year ASME Report for 1950–1960. Several of the most interesting views (not duplicating specific views already cited above) were:

"Most advances in management evolve over a much longer period than ten years."—*George R. Hobart* [21].

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"Management as a profession—There has been a lot of talk but relatively little action in this area."—*William R. Spriegel* [22].

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"Greater progress in last 10 years in Management field than (almost) last fifty years. . . . Entirely new concept of Management's over-all responsibility. Much more realization that Management has a professional job to do. . . . 'Professional' in sense it is (1) Based on a body of knowledge (2) Realization that it involves somebody else. . . . [and so] greater responsibility of Management to others—to the public—in addition to owners, customers and employees (3) Ethical concepts have always been built around a Profession."—*Donald K. David* [23].

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"During the past decade we have seen the emergence of management as a profession. This development has been characterized by the slow but significant accumulation of a body of classified management knowledge, the formulation of a consistent vocabulary of management, and the identification of underlying principles that apply to management wherever it is practised—in business, education, or government."—*Louis A. Allen* [24].

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"If these (after citing need for an established body of operational content, affirmation of a public interest, and a code of ethical prescriptions) are approximately the conditions of a calling's professional status, it would seem that whatever may be true a few years hence we have in administration a vocation which can be professionally approached and approximated, in which people with professional attitudes are increasingly welcome, in which the gradual building of professional standards of practice and codes of ethical performance are of high importance. But there is not yet the degree of uniformity of principles or practices, of standards or dictates as to moral correctness, which would admit administrators today into professional ranks."—*Dr. Ordway Tead* [25].

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"The past decade has been marked by constant breakthroughs in our knowledge of business structure and organization, based, for the greater part on organizational innovations made in industry. It is these advances which put us in position to (develop a statement to bring into complete and usable form what we know about, What is a business, The work of a manager, and the forms of organization and business structure which have developed in contemporary business and through which the business works to achieve the goals for which it was designed)—a statement containing both *principles* and approach *knowledge* which will be timely in view of the requirements of managing a business in the next decade."—*Dr. Howard W. Johnson* [26].

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"It has been remarked that the most striking new thing in American business is the present interest that businessmen are showing in important matters not directly concerned in their own calling, not only in the public matters which are every citizen's business, but in those matters of thought and science, of scholarship and art, which make the quality of our lives and shape our ultimate fate. . . . American businessmen are showing newer and stronger signs of being interested, not only as individuals, as has always been the case, but as members of a *professional* group, in the whole context of our civilization."—The late *Dr. Lyman Bryson* [27].

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"To develop the status of a profession, management must discover the underlying principles which unify its separate aspects. It must develop a basic theory of behavior. It must learn how to convert experiences and particular case examples into a contribu-

tion to this general theory. And finally it must be able to employ the basic principles of the theory as a useful, practical guide for explaining and solving new problems as they arise. By accomplishing these aims, management will become a true profession during the next generation."—*Professor Jay W. Forrester* [28].

* * * *

"Management as a Profession—I shouldn't be surprised if the management viewpoint has made more progress in the past ten years than in any other decade. Whole nations now realize that management is the key to their progress. . . . The past ten years have seen a much closer working relationship between science, engineering, and management than there ever was before. . . . Not only has there been a considerable extension of schools throughout the world, but also the management viewpoint is coming to be recognized as a possible means of solving some of the world's most complicated problems. . . . In conclusion, both in geographical extent and in depth, the management profession has greatly accelerated during the past ten years and therefore the challenge to supply an effective philosophy and a workable content is even greater than it has been in the past."—*Dr. Marshall E. Dimock* [29].

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"The solid structure and importance of the modern Corporation has become increasingly clear over the past ten years. The pioneer work of Berle and Means during the thirties, of Burnham and Drucker during the forties has now come to a head. The Corporation is increasingly recognized as an informal 'political' agency—political in the sense that it is a major power center in modern industrial society. . . . Relevant information and some theorizing on the increasingly important role of the modern Corporation may be found in numerous studies of both industry and the community. . . . *Management Theory* increasingly revolves about the structure of organization and the decision-making process. The approach has been on many planes:—general organizational theories, descriptions of organizational and bureaucratic behavior, efforts to create mathematical models for decision processes. . . . Mathematical models for decision-making are thus far largely restricted to 'operational' rather than 'policy' decisions (suboptimization rather than optimization). . . . The organization is increasingly viewed as a communications mechanism; a large servo-mechanism employing feedback, itself composed of numerous subsystems. . . . Keys to the further refinement of the theory of organization and of decision-making may well be found in the work of the social and behavioral scientists. . . . There is an increasing awareness that the organization exists not only in a given socio-cultural environment, but that it exists longitudinally in time—that its values, made of operation and of thoughts, its institutional structure and environment are the products of a history and a civilization. This has lead Columbia University's Graduate School of Business (under Dean Courtney C. Brown) to introduce a new course program 'Foundations of the Business Enterprise' which explains the business organization in its cultural and historical context."—*Professor Charles R. Dechert* [30].

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"Colleges and universities (after the Second World War) set up advanced programs of executive development while a number of large *corporations*, finding these facilities inadequate, set up sizable programs within their own organizations. The specialized programs of the past which had trained a man for sales work or for engineering or finance were supplemented by *advanced management programs* designed to give an over-all understanding of business and the environment—economic, social, and governmental—in which it operates. . . . These educational approaches had a twofold purpose: one was to develop a sufficient number of generalists to plan and direct the over-all activities of a large organization, and, secondly, to develop on the part of executives in specialized fields an appreciation of the over-all picture and relationship so that they could operate not only as specialists but as members of the entire team."—*T. E. Clemmons* [31].

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"Management as a Profession—There has been much exhortation that a manager should be professional, but as yet, little concrete information concerning what makes a manager professional. The fact that there is exhortation, that there is a market for exhortative articles and talks is a mark of progress of the last decade."—*Melvin L. Hurni* [32].

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"Management as a Profession—There has, I think, been a growing appreciation among the best business leaders of the importance of the professional approach to managing; of Ralph Cordiner's 'New Frontiers for Professional Managers' as a constructive statement of the position in the business world. ACME (the Association of Consulting Management Engineers) continues to do good work in organizing the consultants, who are most truly the *professionals* among the managers (cf. the law or accounting)."—*Col. Lyndall F. Urwick* [33].

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"In four areas do I believe significant changes of major importance to the discipline and practice of management have occurred during the last ten years. (1) Management has emerged everywhere as a major leadership function in society, and especially as a necessary and scarce resource of economic development. . . . Management is no longer a concern of the 'White Man.' It has become international and inter-racial and the sooner we in the West find out that Management is not a matter of race, creed, or color, the better—and this implies also willingness to admit that we can learn from others, and that the traditions, knowledge, values, and beliefs of other peoples and other races are relevant and important. . . .

"(2) There has, during the last ten years, been a general realization of the specific nature and limited function of management, especially of the fact that it is no substitute for political leadership. . . . (3) *Top Management* has emerged as a specific function and its work as a specific generic work rather than as 'the highest level' of operating work. Top Management continues to be the least known, the least studied, and the worst organized part of management. But a beginning has been made in that it has now become clear that top management has to be studied as a specific function rather than as an extension of supervisory or functional work. . . . (4) The '*Management Sciences*' have come into public view—and may even slowly come into focus. . . . By and large, however, the work so far suffers from all the mistakes usually made in the beginning of a new discipline. . . . The fact remains, however, that the emergence of the 'Management Sciences' means the expansion of the *systematic* approach to the work of managing beyond the 'Scientific Management' of forty years ago—the first major step since Taylor, Gantt, and Gilbreth to give management a formal logic and a specific discipline of its own."—*Dr. Peter F. Drucker* [34].

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"Important advances during the decade of the 50's—. . . . the tremendous change of attitude regarding management that has occurred during this period . . . . a crucial accomplishment that from the crucible of soul-searching by practitioners and educators has finally come a general agreement that management deserves the fullest and best attention that industry and education can give it. I feel that the 50's was the first decade in which this realization became general . . . . the 50's have seen the goundwork for great advances laid by the recognition of management as a true field of potential professionalism."—*Professor M. J. Jucius* [35].

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"I will speak first about the ideas that bring us together, then about the applications that make us work together in practice. . . . The ideas can be summarized in three propositions. . . . *First,* Political Democracy can not function in modern society without economic and social democracy which is in the first place industrial democracy. . . . Industrial Democracy must be the body of organic cells of democracy because adult man spends the best of his conscious hours in the community of work. . . . *Second,* Real respect for the rights of man can only become a way of life in industrial, as in any other society, through practical faith in God, who created all men equal and endowed them with inalienable rights, amongst them life, liberty, and the pursuit of happiness. . . . The spirit of service, soul of good management, is a religious spirit even if God is not explicitly considered. . . . *Third,* It is the historic responsibility of the managerial leaders now to be the founding fathers of the second industrial revolution, which means to create first a sound philosophy of management and then to create a new society. . . . These three closely connected ideas are expressed in the life and work of our three guests of honor."—*Very Reverend Felix A. Morlion, O.P.* [36].

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"Management as a Profession—A profession cannot develop in the absence of a philosophy. Many books and articles were published during the decade that emphasized the development of management as a profession, or the need of a management philosophy as the basis for such a development. Many executives and management educators stated their philosophies of management for the benefit of other executives and the public.

". . . . Burnham's book on 'The Managerial Revolution' caught the imagination of many at the beginning of the decade. Toward the end of the decade we had AMA's (American Management Association) 'Management Creed and Philosophies,' SAM's (Society for Advancement of Management) series in Advanced Management dealing with the subject of 'My Philosophy of Management,' and various statements or monographs that dealt chiefly with the personal philosophies of outstanding business leaders—(e.g., books in the McKinsey Lecture series at Columbia University by Ralph J. Cordiner of General Electric, Theodore J. Houser of Sears Roebuck, Crawford J. Greenewalt of duPont, Roger M. Blough of United States Steel, and Frederick R. Kappel of American Telephone & Telegraph). It can be said that management made rapid progress, during the 1950's, in the direction of a mature profession. It can not be said, of course, that it attained this status."—*Dr. Ralph C. Davis* [37].

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"I am not a manager myself nor have I ever had a close-up experience in management. My views must be those of a 'spectator,' a non-specialist, and these often, in my opinion quite wrongly, are despised by a world riddled with specialists. . . .

"*The Manager and the Present European Social Structure*—Doubtless the manager in his daily work is faced with many concrete problems of organization, marketing, labour questions, human relations, and many more. It is quite possible that some 50 years ago these, with few exceptions, were the only ones of interest to him. . . . When we come to investigate the social background we immediately come up against the suspicion that this so-called social background does not really deserve to be called a 'background.' The term means something durable, closely knit, solid, on which one can afford to stand with both feet. . . . In actual fact the society of today—and not only in Europe—is in a state of movement and flux. I would say it is a fluid material on which the feet find no grasp. On the ground of our present-day society one cannot walk but only swim. . . . Yet in this position of flux managers have over the last few years achieved great things. The rise of production in England, France, Italy, and particularly Germany bears witness to this achievement. It shows that it is possible to work and advance on this fluid element. . . .

"Since production takes the first rank in the lives of our community and since on it everything else depends, it is from this production in the new form that one could expect the only really great policy of outstanding magnitude, the only one that could save the existence of the West. . . .

"But this transformation cannot be achieved if we do nothing more than introduce from above this project and that of grand appearance through which an attempt is being made to unite a part of production. I do not wish to diminish the significance of these excellent attempts, but in my opinion you have to start from below, i.e., with each single enterprise. How could this be done?

"*The Historic Role of Managers*—Here I see the historic mission of the works managers. . . . Only if they have a comprehensive and practical picture of the fundamental conditions for the uniting of the European economy and decide to recognize the organizational structure of their undertaking to suit this purpose can this colossal revolution be accomplished. That is why the title for this address is so opportunely chosen. . . . The task is a difficult one and falls upon men, the managers, who are already laden with tasks that their own industry imposes upon them. Is it not asking too much of them to obtain on top of everything a clear picture of this immense transformation? Maybe, but we are here faced with a task that cannot be avoided: an historical mission.

"Neither the politicians nor even the economists are the right persons to lay the foundation for such an all embracing fundamental change; it is the managers and no one else. . . ."—The late *Professor Jose Ortega y Gasset* [38].

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"In approaching the subject of my address . . . . let me say at the outset, that the manager is the dynamic, life-giving element in every business. . . . In a competitive economy above all, the quality and performance of the managers determine the success of the business enterprise. . . .

"Management is also a distinct and leading group in any industrial society. On its performance ultimately depends the standard of living of a nation as well as the strength of its social beliefs, its social cohesion, and its ability to withstand the poison of totalitarianism.

"What do we mean by 'manager'? What distinguishes a manager from the businessman as the economists see him on the one hand, and from the administrator in government, the armed forces, or the church on the other? A manager deals with economic resources. He aims at economic performance and is measured by economic results. That distinguishes him from the administrator in any noneconomic institution.

"The businessman of the economists behaves purely in adaptation to economic forces which he neither creates nor controls. . . . By contrast a manager manages. . . . In other words to be a manager implies the responsibility for attempting to master the economic environment—and the social environment too; for planning, initiating, and carrying through changes in economic conditions; for constantly pushing back the limitations of economic circumstances on the enterprise's freedom of action and on the economy's standard of living. What is possible is only one part of the manager's job. What is desirable in the interest of the enterprise and society in general is the other. . . .

"Perhaps you are surprised that a hard-headed businessman like myself defines management in terms of morality. . . . Let me therefore stress that it is precisely because I am a hard-headed businessman that I lay the foundations of Management on moral values. . . ."—*Henning W. Prentis, Jr.* [39].

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"All sections of an industrial-agricultural economy: labor, owners, consumers, and government claim the satisfaction of their material needs from Management. Management is the fifth force, the co-ordinating force in our industrial society, responsible to and for the common good.

"Management per se, whether in the home, the farms, in government, or business has progressed, in the U.S.A., from the position as a representative of ownership to that of a force, a profession, dedicated to manage, to direct people for the balanced attainment of their natural aspirations.

"Management in the U.S.A. progressed to that stage by an intuitively given awareness that by its decisions or lack of them it influences the livelihood not only of those immediately affected by its decisions but also society at large. It became, in the U. S. A., the proponent of a free society.

"This profession of Management, as the co-ordinating, balancing force, is grounded in, and by its enlightened actions gives substance to the very concept of a Christian society based on the Golden Rule.

"Indeed, Management must even bear the burden to satisfy a spiritual need of Man. Because, by demonstrating through its actions that the individual is the greatest single factor in an industrial society, it makes it possible for the individual to pursue the satisfaction of his spiritual needs without contradiction in economic fact.

"Intuitively, Management in the U.S.A. has taken the road of the champion of the common good. It has done so, over the past twenty years, by a constant, persistent effort to examine and educate itself. It has thereby pushed the frontiers of its first narrowly conceived calling into the center of the preservation of a Free Society."—*Albrecht M. Lederer* [40].

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The foregoing sampling of expert viewpoints on progress of "Management as a Profession" in the 1950's, could be extended indefinitely but the range of reactions would not be materially different than as exposed in the diverse comments set forth in the preceding paragraphs.

The reader can formulate his own "concensus" but, on balance, it is certainly a record of visible, accelerating, significant progress *toward* both recognition and practice of the Work of a Manager in a more and more Professional manner—yet with general agreement that, as in the evolution of any other *new* "Profession" the road is long, progress is slow, and the best is yet to come.

Base for "Manageability" Research in the 1960's

Taking Dr. Gulick's penetrating advice to analyze progress in the 1950's toward "Management as a Profession" from the viewpoint of the visible needs of the 1960's, it is apparent that a foundation for tremendous further advances in that coming decade has been solidly laid.

But to insure ability to meet the *Manageability* needs of growing complexity in all phases of technological, economic, political, and social or organizing developments, it is equally apparent that several *new* requirements are rapidly emerging; and that they too increasingly call for more Professional Managers.

An image of concepts to *research for Manageability* of large enterprises, for the future, may consequently be visualized in these terms:

"Today's industrial society is one of high organization; its growth momentum indicates, furthermore, that this characteristic trait will become more pronounced with time. . . . The individual becomes effective, his competences grow and develop, when these organizations are so designed as to afford an effective outlet for his competences—which means his *work*.

"The 'business enterprise' has emerged as an . . . . *economic* institution which, therefore, is increasingly being considered as one that *also* discharges duties that are socially essential. Managing is a special type of work connected with the operation of the business enterprise. . . . Knowledge about managing should be a discipline thought-through with enough rigor to permit identification of the needed competences in a way that makes generalizations possible in terms of the analysis of facts with which a manager deals, the nature of actions he takes, the decisions through which he converts thought into action. In this there is implied an understanding of a specific kind of responsibility and of a discernible kind of attitude toward the work. . . .

"In terms of its dynamic aspects, namely, in terms of time, the business enterprise can be described as an *economic* plan interlaced with an *organization* plan, neither of which should be conceived independently from the other.

"Both these plans are statements to the effect that the enterprise, although a means for reaching economic ends, is a special kind of means made of Human Actions. The human characteristics of the enterprise are the wide matrix which encompasses Managing work and it is within this matrix that economic ends are achieved by the creation of 'values'. . . .

"It can, therefore, be seen that managing is a dynamic locus within the enterprise where action should, ideally, occur in terms of future situation images which have been organized into matrices that are called 'plans.' Managing, in other words, appears increasingly in the form of work which contributes to the values of the enterprise by dealing systematically with the *future* of the enterprise.

"Work which is so described and which consists of actions involving a commitment of present availabilities and a shaping of future situations, is in itself a *professional* discipline and, because of the ethical characteristics of the action, a discipline which could be called 'moral.'

"The name '*moral*' appears more pertinent than 'social' or 'behavioral' which are usually favored in current literature. This is because the term 'moral' involves a commitment to a position. That is, a commitment to an outlook and to an attitude. As long as such commitments are necessary, it is undoubtedly better to express them in a way which makes their nature clear.

"It is within such an understanding that the systematic development of knowledge about managing work should occur, for it appears difficult, even impossible, to visualize a combination of essential social and economic duties, occurring in terms of change and the future, to be based on anything but an idea of leadership.

"Leadership within the framework of a free and open society such as the one developed by Western capitalism, as a whole, cannot be conceived of in the traditional terms of the exercise of 'power.' The only alternative which can accommodate the concept of leadership is moral. And it must be squarely fronted—at least as a presupposition from the vantage point of which ideas like action, organization, time, future, measurement, and risk can be clarified thanks to a new light. . . .

"Facts as they exist, the day-to-day so-called 'practical' facts which involve the serious operations that lead to the accumulation of capital, to profits, to wealth and prosperity, are the same as they have always been. And it is with them that any new Management Research investigation is bound to deal. What is different, however, is that what people have always understood when they spoke about such facts was merely their interpretation of them in terms of a method which they had come to accept and which was satisfactory at the time.

"What now seems to be needed is to look at those same facts and also at some additional ones, but in a method which 'processes' them in a manner more consonant with emerging needs. Thus one can remain practical. Practicality being consonance and understanding of how odd facts add up, through a new method and perception, to a new and different reality."—*Edward D. Kemble and Hasan Ozbekkan* [41].

Growing Body of Management Research "Information"

A final kind of evidence that a "Profession" is taking shape—based on a discrete learnable and teachable body of organized knowledge and of an ethical code in its development and use—is the presence and existence of a growing body of literature; of pertinent and penetrating *Management Research;* and of systematic professional meetings and discussion to help in the creation, enlargement, understanding, and ethical application of the applicable body of knowledge. Such Research is, therefore, another convincing indication of progress in the Fifties toward "Management as a Profession" and of the presence of movement and momentum for more such progress in the decade of the Sixties.

The "*new*" dimension of perhaps greatest significance for keeping future enterprises manageable is found in the parallel trends toward multiplying complexities surrounding organized activities, on the one hand, and toward improving sources of needed Information to comprehend and deal with such multiplying complexities, on the other hand.

Not the least important characteristic of such evolving *Information* is the capacity, earlier cited, to organize it into *systems and patterns* which take the form of concepts, criteria, and general theses and principles, as distinct from odd facts about isolated cases.

Such developments, as the last prior quotation indicates, do not mean that the Professional Manager—unlike the entrepreneurial owner-manager of yore—has to become a "theorist" who deals only in generalities rather than in specifics and specialties and cases.

On the contrary, only as theory and practice are kept in contact and in balance can either remain vital, dynamic, and usable in Managing complex situations through complex organizations of people freely and creatively doing Human Work productively.

But the examination of "cases" does require—to keep the growing enterprise continually manageable under such realistic pressures—looking at them not solely from a *clinical* standpoint as formerly, but now also from a *diagnostic* approach, to see if—by the timely application of "theory" already developed and verified—it may *not* be essential, as Lemuel R. Boulware once so graphically put it, "for every new manager to start in the Garden of Eden."

Keeping Professional Work "Professional"

Neither is it necessary to go to the absurd extreme of considering that "the chief characteristic of man's work in our time is that all occupations tend to become professions; and these professions, following the example of medicine and law in past centuries, tend to become academic subjects" [42]. For this is an oversimplification which Dr. Barzun then skillfully exposes and effectively demolishes. His advice to *real* "professionals" on how to avoid such oversimplification by revolting ahead of time against it, is pertinent here for all thoughtful Managers trying to do their work professionally:

"*First,* do not tolerate cant, especially in yourself. Talk nonsense all you want, but not cant—which is to say, pretense, make-believe, play-acting. Give these no quarter—in your tastes, your views, your hopes, your fears, your merits, your faults.

"*Second,* for the sake of your work, attach yourself, in reality or imagination to a doer—a living man or an historical figure—from the study of whose example you may draw instruction, warning, and the vivifying force of past accomplishment clearly conceived.

"If you do these two things with pertinacity and point, then no matter what your profession and your fate, and no matter how few of you survive to the end the pressures of the environment, those who have preceded you and who have not buried their talents will cheerfully leave the stage to you, confident and grateful, free from the mortal doubt: 'Where are the disciples?'"—*Dr. Jacques Barzun* [42].

Certainly as the decade of the Fifties closes, the "pressures of the environment" are enormously heavy. The tendency to resort to concentrated authority to cope with them is in proportion. The human requirement to avoid doing that and to preserve individual dignity and freedom in complex organizations under such pressures is correspondingly great—which is precisely the task, then, faced by the "Professional Manager" for the Sixties.

It is to be feared that to many people, yet, the concept of "decentralization" merely means the classic type of centralized governing authority—or in industry, managerial authority—with its inherent "top-down" approach, applied to smaller and dispersed components of people, rather than directly to very large, collective organizations—either States or corporate industrial enterprises.

This is one tenable concept of "decentralization." But it merely represents the centralist, or authoritarian, philosophy unchanged in its nature and restrained only by limiting the scope of its application, as to number of people or area so governed. This, by itself, is still desirable; tending to disperse and balance and thus to limit "power" and its potential bad consequences if over-extended and over-centralized.

But this alone does *not* represent any *change* in the philosophy of relationships among men involved—but merely application of the authoritarian philosophy on a more limited basis.

The limited area of impact would, in no fundamental sense, mean abandonment of "rule" by command or dictation from the top, rather than by inspiration and persuasion to get voluntary initiative and participation from the followers, no less than the leaders, to progress toward jointly held common interests and purposes.

It is in this latter direction, that there is need—as *Professional* Managers—to seek real "decentralization" in the sense of a sincere change in the philosophy held and applied; in order to achieve a system of Leadership in which both "managers," and their professional and other worker associates, define common interests, translate these into common purposes or objectives or goals; and then—initially and voluntarily—accept individual responsibility to make personal decisions—at whatever level of the organizational hierarchy—in the interests of the over-all enterprise and not *merely* in the interest of their individual selves or individual jobs or individual organization components.

This would involve a genuinely *different philosophy;* namely, that of accepting responsibility to act and to do things right, in the first place, on one's own initiative. It is from this new foundational philosophy, it would seem clear, that it is most possible truly to get desired organizational effects such as creative productivity and low-cost operations and, simultaneously, to achieve deeply personal satisfactions.

The critical question from progress of the Fifties toward management as a profession, is whether such a goal represents merely visionary dreaming—branded as such by history and experience—or whether, since History is only a prelude, our revolutionary recent advances in technology—applied to ideas and information rather than only to products—have introduced truly new knowledge and circumstances which may make such different "professional" advances feasible.

The Promise for the Sixties

It is a plausible premise here, to move into the Sixties, that really *new* factors, of just such favorable portent, do constitute the unique characteristic of recent advances.

The new element of such dimensions, in this author's judgment at least, is that, for the first time in history, we now *can* see the possibility of having, first, the information, and second, the means

of communicating it to *all* persons and all echelons in particular institutional organizations—whether industrial or governmental or otherwise—on a scale never feasible before; on a scale whereby individuals *can* make personal decisions with "upstairs vision" sensibly and realistically.

If they can have such information, and if managers can, through sincere and enlightened professional leadership, help them to get it and to know how to use it, then they will be able to fulfill the kind of genuinely "decentralized" and personalized responsibility which such a vision calls for; to do so effectively on an increasingly wide scale; and to do so voluntarily and with creative initiative and resultant personal satisfaction.

Such a goal—basing the organization on Responsibility for creative personal work, even when functioning in an organized institutional framework, and not merely on top-down authority—would be a truly new and advanced phase (a causative anticipation phase, to give it a name) of the historic industrial revolution.

The great difference, of course, would be that, with both the individual worker and the "manager" trying consciously—and with adequate, needed information mutually available—to achieve the *same* goal, past "need" for top-down inspection, supervision; audit, correction, and similarly motivated forms of guidance, could ultimately be essentially removed.

Professional Managers and Professional Management Scientists—A Summary

To summarize, therefore, this ASME report discussion on progress in the 1950's with respect to "Management as a Profession," and as at least one basis for continuing inquiry and deeper Management Research in the field in the 1960's, perhaps the following concepts—taken from a paper on "Research—And Shaping the Future of Management," delivered by the author [43] at the Annual Meeting of the Academy of Management in Washington, D. C., on December 29, 1959, *almost* the exact end of the decade—may be helpful for both verification and guidance:

(1) Managing is a distinct and a professional kind of work; with its own organized body of knowledge and its own code of ethics in the application of such knowledge.

(2) The Manager is distinct from the owner, or the true entrepreneur of classic economics, because as a person he takes risks without assuming personal economic consequence in close proportion.

(3) But such risk-taking is also a function of nonmanagers in business—that is of Functional Individual Contributors, and especially the professional ones—no less than of managers.

(4) In brief, both make decisions and make riskful decisions.

(5) Both, therefore—and here is the future opportunity for the "Management Scientist"—need orderly, better-organized *Information;* and they need it for new kinds of "facts," of both broader and vaguer nature than those of the physical sciences, as well as on such phases of work as the over-all climate, flow, and system in which it is done.

(6) Even in such newly changing and complex situations, however, the scientific approach can be applied to find "principles"; and increasingly can do so in volitional, not merely in mechanical, systems.

(7) These two kinds of "systems"—while both are "systems"—are distinct and different in a way, even more fundamental than they are similar.

(8) "Change" is characteristic of both; and at an accelerating rate, most typically.

(9) But with science, research, and resultant scientific knowledge multiplying as it is today, *change is normal,* not abnormal. This is another reason why both Managers and nonmanagers have expanding need for better and better-organized Information for decisions. The development by research, and the preparation and making available of, such better Information can be a real contribution from Management Science to Professonal Managers.

(10) The work of a "Management Scientist" in such sense, however, itself needs to be sharply distinct and differentiated from the work of a "professional Manager." These are both emerging *professional* kinds of work; *both* are needed and will become more so; and the two are distinct and separate.

(11) Hence, *organized* "Information"—and ways to use it to find principles, patterns, environmental, or over-all concepts, and so on—is the genuine needed Management Research "output" from Management Science; rather than mere project-probing, and over-simple solutions to narrow Operating problems. The mission called for, of course, in such Research, is much broader than mere "quantification," even though the latter type of effort needs to be extended to new areas, where feasible, by the approach of such new Science.

(12) The work of managerial and organization "theory-building," to perform Research of such a scope, clearly needs to cover the environment of the Manager, the economic and organization actions which he takes in integrating "Individual Human Work," and deep comprehension of all the Manageability aspects of both such environment and such action.

Perhaps the most important implications of such concept of Manageability are found in what it calls for as to Long-range Planning.

When economic and organizing actions are looked at in terms of the future, new factors appear. In particular, a somewhat new relationship between the future and the present emerges with unusual emphasis. It points to the fact that, prospectively, systematic and detailed *Anticipation* of future situations and conditions should increasingly underlie and guide Managing actions—even those directed to the opportunities offered by present environments.

Thus a conscious and consistent long-range view, permitting future expectations to guide actions in the present, should lead, in turn, to development of an increasingly competent approach to Operational planning—which, in the last resort, thus becomes a *method of work* allowing every individual in the Operating organization himself to participate in *shaping a future,* rather than merely *adapting* to it.

Such *Research,* to shape the future of Management, can well become a thrilling voyage of inquiry and discovery, conducted on the storm-tossed seas of the present, but keeping the boat firmly aimed at the distant port of future Professional Managing competence, applying *organized* knowledge with truly *professional* discipline and ethics.

The twin resultant opportunity, for both Research and Teaching, unfolds in the University and in the Business Enterprise in parallel; and the consequent challenge is great for all.

The researcher who can cope graciously and ably with such challenge is truly a *creative* and a *professional* worker, with the *artist's* capacity to conceptualize, idealize, and simplify. And a special plea is in order here for joint progress, as true "peers," of *all* such researchers, whether on the Business or the University staff currently.

In an interesting comment by a wise Frenchman on our contemporary American ways, there is a passage which seems to illuminate the joint challenge in a way fitting for closing this report discussion. It is from R. L. Bruckberger's book, "One Sky to Share":

"The artist is linked more closely than is generally believed to certain conditions of climate, of habitat, of social structure, of civilization, of landscape.

"I believe that it is a presumptuous error to think of the artist as an uprooted person, and that he is not sociologically imbedded in the *organic* destiny of the nation. He is in it *like a leaven,* but he is *inside* it. Too bad for the leaven that scorns the dough.

What is a leaven by itself? It is the worst of migrations, pure bitterness.

"The leaven must stimulate, raise the dough, be to it like a great internal quarrel. The heavier the dough, the more violent must its effort be, the quicker its incitement, but the effort and the incitement must take place *within* the dough, and the leaven must accept the dough for what it is because they are destined to belong to each other" [44].

References

1 Letter, Dec. 4, 1959, Luther Gulick to the co-editors of this ASME Report.

2 Letter from Zay Jeffries, dated April 22, 1953, subsequently quoted on p. 95 of "New Frontiers for Professional Managers," by Ralph J. Cordiner; published by McGraw-Hill Book Company, Inc., New York, N. Y., to record the first annual McKinsey Foundation Lectures at Columbia University, in 1956.

3 Definition (*a*) of "Science" and (*b*) of "Profession," The Winston Simplified Dictionary, 1935.

4 From p. 4 of "Administration: Its Purpose and Performance," by Dr. Ordway Tead, published by Harper & Brothers, New York, N. Y., 1959, to record the second annual Ford Distinguished Lectures at New York University.

5 Pamphlet, "Spiritual Experience in Administration"; published, 1951, The American University Press, pp. 14–15.

6 For example, see the deeply scholarly lecture at the CIOS Congress in Paris in 1957 by Col. Lyndall F. Urwick on "The Life and Work of Frederick Winslow Taylor," to commemorate the 100th Anniversary of Taylor's birth; especially pp. 12 to 15 of pamphlet edition published by Urwick, Orr & Partners Ltd., London, England.

7 Pamphlet, "The Changing Philosophy of Management," by Dr. Erwin H. Schell, 1959 address before Society for Advancement of Management; p. 1 of reprint by Keystone Custodian Funds, Inc., Boston, Mass.

8 Letter Nov. 23, 1959, Malcolm P. MacNair, Lincoln Filene Professor of Retailing at Harvard University Graduate School of Business Administration, to co-editors.

9 Paper on "Managerial Decision-Making," at Annual Fall Conference, Society for Advancement of Management, New York, N. Y., October, 1958, by Harold F. Smiddy.

10 Dr. Norbert Wiener, "Human Use of Human Beings: Cybernetics and Society," Houghton Mifflin Company, Boston, Mass., 1950.

11 Dr. Donald K. David, in interview on Dec. 16, 1959, with co-editors of this ASME Report.

12 Chart, "The Work of a Professional Manager," from Book Three (after p. 232) of series on "Professional Management in General Electric," (1954); limited copies made available to United States business school reference libraries in 1959.

13 Article by Dean Acheson in *New York Times Magazine*, Oct. 11, 1959, on "Thoughts About Thought in High Places."

14 Letter to co-editors of this Report, Dec. 4, 1959, from Dr. Simon Ramo, Executive Vice President of Thompson Ramo Wooldridge Inc.

15 Inaugural talk by Raul Saez, General Manager of ENDESA (large Chilean electric power system) and Chairman of ICARE; at first PACCIOS Management Congress, São Paulo, Brazil, November 12, 1956.

16 Article by Dr. Sumner H. Slichter, on "Basic Trends in the Economy and Effect Upon Securities," reprinted from *The Commercial and Financial Chronicle*, November 15, 1956; pp. 3, 4.

17 Urwick Lecture reprint, reference [6], p. 11.

18 Book "The Two Cultures and the Scientific Revolution," by C. P. Snow, Cambridge University Press, New York, N. Y., 1959.

19 Article from *Fortune* magazine for August, 1957, by Henry R. Luce, entitled: "The Character of the Businessman," p. 108.

20 "New Frontiers for Professional Managers," reference [2], pp. 16–17.

21 Letter Nov. 30, 1959, to co-editors from George R. Hobart, Vice-President—Administration, Worthington Corporation.

22 Letter Nov. 24, 1959, to co-editors from William R. Spriegel, Professor of Management, The University of Texas.

23 See reference [11].

24 Letter Nov. 25, 1959, to co-editors from Mr. Allen of Louis A. Allen Associates, Palo Alto, Calif.

25 See reference [4], p. 71.

26 Adapted from a letter of April 21, 1960, by Dr. Howard W. Johnson, Dean of the School of Industrial Management at Massachusetts Institute of Technology.

27 Book on "Facing the Future's Risks," edited by the late Dr. Lyman Bryson of Columbia University, Harpers, 1953, p. 1.

28 Prof. Jay W. Forrester of Massachusetts Institute of Technology, as quoted (p. 78) in reprint of article from vol. 1, no. 3, Spring of 1959 of California Management Review, by Dr. Thomas H. Carroll, Vice President of the Ford Foundation, writing on "Towards a Liberal Education for Business."

29 From "Memorandum for ASME," with letter of Jan., 1960, to co-editors from Dr. Marshall E. Dimock, All-University Head of Department of Government, New York University Graduate School of Arts and Sciences.

30 Letter—and appended memo and extensive bibliography—of Dec. 15, 1959, to co-editors from Prof. Charles R. Dechert, Department of History, Government and Philosophy, Purdue University.

31 Memo of Dec. 22, 1959, on "Ten Years' Progress in Management Development" by T. E. Clemmons, Director Executive Development, IBM Corporation.

32 Memo of Dec. 18, 1959, to co-editors from Melvin L. Hurni, Manager—Operations Research & Synthesis Consulting Service, General Electric Co., New York, N. Y.

33 Letter of Dec. 2, 1959, to co-editors from Col. Lyndall F. Urwick, London.

34 Letter of Dec. 21, 1959, to co-editors from Dr. Peter F. Drucker, Professor at New York University, author and individual Management Consultant.

35 Letter of Dec. 8, 1959, to co-editors from Prof. M. J. Jucius, Department of Business Organization, The Ohio State University.

36 Address by Very Reverend Felix A. Morlion, O.P., President of the International University of Social Studies, Pro Deo, at Rome, Italy—at CIPM Luncheon in New York on June 5, 1957.

37 Letter and memo of Dec. 14, 1959, to co-editors from Dr. Ralph C. Davis, author and Professor of Business Organization at Ohio State University.

38 From keynote talk on "The Social Background to European Management," at European Management Congress of CECIOS, at Torquay, England, Oct. 20–23, 1954, by the late Prof. Jose Ortega y Gasset; translated from the German by Hon. Olaf Brann, then of the British Institute of Management.

39 Keynote address at Xth International Management Congress at São Paulo, Brazil, on February 19, 1954; by the late Henning W. Prentis, Jr., Chairman of the Board, Armstrong Cork Co., Lancaster, Pa.

40 Memorandum in July, 1953, by Albrecht M. Lederer, President of Council for International Progress in Management (USA) Inc., the United States affiliate national management committee of CIOS.

41 Excerpts from highly condensed summary of working papers of some Management Research—from 1955 to 1960—still in process of development at this writing by Edward D. Kemble, Manager—Management Research Service, and Hasan Ozbekkan—Consultant, Management Research, General Electric Management Research & Development Institute, Crotonville, Ossining, N. Y.

42 Article on "The Conditions of Success," by Dr. Jacques Barzun, in *Vogue* magazine, March 1, 1960.

43 Proceedings of Annual Meeting, 1959, of Academy of Management at Washington, D. C.; paper (p. 23) by Harold F. Smiddy, Vice President, Management Consultation Services, General Electric Company, New York, N. Y.

44 From "One Sky to Share," by Father R. L. Bruckberger, P. J. Kennedy & Sons, New York, N. Y., 1952; pp. 147–148.

DISCUSSION

Ralph C. Davis[3]

The author of this paper is a mature experienced executive and management scholar. It is difficult accordingly to find areas of disagreement with him. One must agree, for example, that management is an emerging profession; that it has a long way to go before achieving professional status and certification. On the other hand a constructive contribution would require the delineation of some points of difference. These differences of opinion would have to do chiefly with the nature and requirements for professionalism, their meaning and significance in the case of the field of management, or related considerations. Perhaps we should begin, therefore, with a brief review of the requirements for the development of a professional field.

There is some substantial agreement concerning the nature of these basic requirements. Most professional people would agree probably that a professional field must have:

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1 Service objectives that are recognized and accepted by the members of the profession.

2 A basic philosophy that can serve as a source of value concepts, and as a basis for effective thinking.

3 A code of ethics for the guidance of the members of the profession in what constitutes correct professional conduct.

4 A basic body of professional knowledge, properly organized and classified, that can be taught.

5 A logic of effective thinking for the solution of problems that are found in the particular professional field.

6 Adequate organization and facilities for research in the field.

7 Recognition by the members of the profession of their obligations to conform voluntarily to the requirements of the profession's basic philosophy, including its code of ethics.

8 Acceptance and support of the field by the general public, as one in which professional competence, together with effective farsighted leadership of thought and action, are necessary for the promotion and protection of the public interest.

9 Control of admission to the professional field, or of recognition as a professional member, on the basis of criteria of professional competence that are generally accepted.

10 Some organization of professional practitioners and educators in the field. This organization should be able to promote the development of the field, take appropriate disciplinary action with or without the concurrence of the state, and engage in or promote professional adult education in its field.

Limitations of time and space preclude any thorough discussion of these basic requirements. This commentator will confine his remarks to a few points where he may be able to amplify or extend Mr. Smiddy's analysis.

A good place to begin might be with the objectives of a profession. These are certain service values. These are values that are needed by individuals whom we may call patients or customers, or by organizations for whom the professional man may work, either as an employee or a consultant. The objectives of a business profession, accordingly, are determined by the objectives of the business organizations that must be served. There are some wide differences of opinion, however, concerning what the general objectives of the business organization should be. There is, first, the point of view of the social or behavorial scientist. The author quotes Paul F. Douglass as saying that scientific management is "...a better and better way of doing things by first making better and better people. ...Our job is to make people; our by-product is things...." This makes human development the primary objective of the business objective. There is, however, another school of thought that says that the objective of the business organization is profit. This concept emphasizes the personal interest of owners and general executives. It makes profit the primary objective of the business organization placing it ahead of our obligations to the customer, or to other interests. A third concept of the objective may be called the "Balanced Best Interest" concept. For example, the author quotes President Ralph J. Cordiner of General Electric as saying: "The professional approach requires, in fact, a dedication of the man's self and service, not only to the owners of the business through his board of directors, but also as a steward to the company's customers, its industry, its employees, and to the community at large. The professional manager must consciously place the balanced best interests of those ahead of his own personal interests...." This concept considers all of the interests that may be effected by the operation of a business organization to be its primary objectives. It would appear to violate the principle of paucity in the selection of objectives. When many objectives are designated as the principal objectives of an organization, it is likely that none of them will be accomplished well. A fourth concept might be entitled "The Economic Service" concept. It is the one that this commentator favors. It merely says that the rights of private property and private capitalism create certain corresponding responsibilities and obligations for the private enterprises. These have to do with a continuing contribution to an increasing standard of living for our citizens. The general public is composed largely of all customers of all business organizations everywhere. The values provided by those business organizations constitute largely the economic interests of the public. The primary objectives of the business organization are, accordingly, satisfactions of customer needs with goods and services of the kind desired. These must be of an acceptable quality rendered when and where wanted. These values must be provided at a price that the public will pay, and at a cost that will leave the organization with a competitive profit. These differences in concept of the business objectives can result in some wide differences in the emphasis that is placed on the various functions of the business organization. Furthermore, the decision as to the primary objectives of the business organization can change its entire character. If certain social objectives of the business organization are placed ahead of its economic objectives, for example, the business organization tends to be changed from an economic institution into a social agency. If the public's interest in the business organization is chiefly in its ability to serve the economic needs of the public, then obviously, the business organization will fail to accomplish what the public regards as its primary mission. Be that as it may, it will be difficult to develop a profession of business management until the general public agrees on what should be the basic objectives of a business organization. We may then be able to agree on what should be the basic objectives of a profession that serves the business organization.

Harold Smiddy's paper has brought out many other points of fundamental importance. Limitations of time and space prevent a discussion of them here. It is hoped that his paper will stimulate the widespread discussion that it deserves.

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Practices in General Management New Directions for Organizational Practice[1]

THE advance in the practice of organization [1][2] in the decade 1950–1960 came by way of departure from the practices of 1910–1950. For almost two generations—a space greater than that which separated Einstein and Heisenberg in physics—the work done by the founders of scientific management has remained substantially unchanged, except for minor attempts to elaborate the mechanics of their systems. But the decade of the 1950's was characterized by new questions, new approaches, and the emergence of new institutions.

It is not so much that the change is measured in decades, like building blocks. In fact, the advances of the 1950's are being continued and extended in the 1960's without break. But the past decade did witness a major change in the character of our approach to organization. For while there was unrest, searching, and some experimentation with new organizational structures prior to 1950, most of the changes and advances did come after 1949–1950. This history has not yet been written nor the advances integrated in a formal statement. But in the net, the emergence of fresh organizational competence in this decade was as radical as the emergence of business as the dominant institution in our national life; of the do-it-yourself movement and the change to casual wear; of the appearance of oral and personal modes of communication as the dominant modes of communication in our society; of advanced management education as a uniquely new (for us) form of adult education.

Summary of Practice, 1910–1950

To understand the dimensions of the developments that began in the 1950's it will help to review what was characteristic of the earlier thinking and practice of organization, particularly since much of this thinking still exists and clearly dominates even the current literature.

The early body of organizational practice:

1 *Separated the work of workers from the work of managers.* It is a tribute to the genius of Frederick W. Taylor and Frank B. Gilbreth that they did *not* suppose such a divorce; indeed, what they said about the work of managers was proposed as the direct corollary of experiments in redesigning the work of workers. (It was similarly limited by their consistent assumptions about primitive bits of work, the means of doing it, and the relationship of worker to work.)

Nevertheless, the great body of industrial practice until recently dealt with the work of workers as presenting a separate design problem from the work of managers. Indeed, the design of worker-type work, with its assumptions about the minimizations of task, the adequacy of purely financial incentives, supervision and control, in the typical business, has commonly been abandoned to some methods-engineering group completely isolated from whatever people in the same business may be working at organizational design.

Yet it is impossible to maintain such separation. For the design of the work of workers presents one of the primary elements in the design of the manager's job—in terms not only of technologies and similar productive competences, but also in terms of the design of intelligence and freedom into the total system.

2 *Was focused on the division of labor and assignment of responsibility as the primary organizational task.* It was in this manner that the structural and juridical elements of the system were brought into existence together.

For example, on the assumptions that everybody should have some boss, that nobody should have more than one boss (principle of unity of command), and that the number of people in relationship to whom one could be such a boss must be limited and on the small side, if the relationship be characterized by commanding and controlling (principle of span of control), there was developed inexorably the pyramidal shape or structure, which is part of the classic language of the organization chart. Like all objects which exist in a Euclidian space, the pyramid was forced to grow larger and higher and intermediate levels of supervision or administration were created as the enterprise itself expanded and grew.

At the same time the lines on the chart expressed primarily juridical lines of force. They indicated, for example, the person over whom one has "authority," who is "responsible" for something, and who can be held "accountable" in case something goes wrong. Indeed, such a structure was more frequently a structure of internal positive law than a structure for doing the work of the business. In any event, the structure provided a means of visualizing the means by which a vast pool of authority at the top by something called "delegation" [2] or "scalar process" could be made to cascade over subsequent layers of management and thus be divided among various managerial jobs.

To approach the design of an organization exclusively from the top down, to orient its process to the division of labor and the assignment of responsibility rather than to the mobilization of competences required by the design of the business and the needs of integrated tasks to be performed, and to think of a structure more in terms of juridical than of communication, decision-making, or action requirements—all these are characteristics of organizational practice prior to the 1950's.

3 *Encouraged functionalization.* The typical business (or typical plant for that matter) was divided into sets of organizational pyramids within which were gathered people with a common technical competence—engineering, or any of its branches, accounting, manufacturing, marketing, and the like. It is only fair to note, however, that the pre-World War II business in contrast with businesses today required only a limited number of such competences.

[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

[2] Numbers in brackets designate Notes and References at end of paper.

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Limitations of Previous Approach

It would be impractical and even ungracious in this paper to catalog the limits of such an approach to the organization of managerial work. But well before 1950 as businesses diversified and grew, stepped up their own metabolic rate, and reached out for people of many diversified competences, the inability of the older type structures to support the new complex of activity was already apparent. Let me instance briefly:

1 *Difficulty of achieving integrated action.* As businesses grow large the basic tendency of such structures is to diffuse competences, to dissociate the parties to mutual action, and to create organizational distance between the centers of thinking and action. This limit—frequently described as a problem in communications—imposed itself on business at the very moment when the requirements for more rapid, competent, self-regulated, and integrated action were increasing.

2 *Difficulty of effecting change.* Even the recent literature contains many references to the problems of effecting change in large organizations [3]. Most of the authors, it is true, are concerned with the individual and psychological and behavioral patterns involved or with the sociology of change. But back of this is the basic structural fact that the older organizational structures supposed stasis [4]; they contained no organs or provisions for the management of change where this presents itself as a special task; they were inherently resistant to change and their inertia increased exponentially as a function of size. Managers therefore found themselves faced with organizational structures, increasingly more rigid and immobile, in a period when their need was increasing for relating the business to a dynamic technology, economy, and culture.

3 *Difficulty of developing managers.* When, as Dean E. P. Brooks' paper in this report points out, those first companies in the early 1950's began to study the conditions under which managers actually had developed, they found a basic relationship between organizational structure and the numbers and rates at which their managerial people had risen to levels of higher responsibility. For it was shown consistently that those managers who had functioned as members of a project team, or who had had the opportunity to run even a small but integrated operation, or who in their managerial careers had moved from one functional area to another, had developed more rapidly than their associates who had simply progressed through the standard organizational structure.

4 *Difficulty of rationalizing the system.* Business had arrived by 1950 (and for all practical purposes still is) at the point where the *rationale* of the old organizational structure could not see a manager through. One has only to recall dreary and interminable discussions of "line" and "staff," or of "functional" versus "line" authority. The farther such discussions went, the more confusion was generated. The irrationality of those discussions was clear to all who realized that the work of the company was actually being done in an informal manner outside the prescript of the organization chart. Indeed, the naive assumptions about authority itself and the manner in which it should be exercised in a work structure went increasingly counter to the national purpose and to the education and inclination of a free, multi-skilled, multi-interested work force.

Attempts at Improvement

Well before the 1950's as well as in this decade there were many attempts to counter the foregoing limitations and to make the system more workable. Among these we might list:

1 Decentralization, but viewed simply as the process of "breaking big ones into smaller ones."

2 An increase in understanding of people and benevolence in managerial action introduced through human relations.

3 Development of a similarly benevolent philosophy of "delegation."

4 Attempt to find a dynamic for, or to introduce dynamics into, the system.

These attempts, which brought some measure of relief, may have shown even more clearly the need to start off on a fresh tack. In summary, the state of organizational practice by 1950, and even through much of the decade just completed, is characterized by:

1 The development of pyramidal, many-layered, highly functionalized structures, embodying such "principles" as span of control and the like.

2 The attempt to humanize such structures or bring them under control or help people adjust to life within them.

3 The elaboration of special bodies of "how to" knowledge—for example, how to organize the marketing function, the market research function, the district sales manager's job, ...

These describe both the achievements and the limits of the foregoing body of practice. It would be a mistake to forget the achievement. One need only reflect on those works of Ernest Dale, Louis Allen, Robert Sampson, or Lyndall Urwick [5], which appeared in the 1950's, to appreciate the magnitude of the achievement. If the practice of organization has begun to move in another direction without having yet demonstrated a comparable achievement, it is because the requirements of men at work and the requirements of running a business have forced the change.

Sources of Developments, 1950–1960

In his reply to the authors of this report Dean Donald K. David remarks that greater progress has been made in the last ten years than in the previous forty; in part he relates this progress to top management's requirement to spend more time dealing with outside forces—government, unions, public, and the like; he then adds that automation, electronic information handling, and organization (decentralization) have begun to make this possible. This is true. Dean David may even have identified here the major motivational force behind changes in the practice of organization. But from another point of view the experiments and inputs have been so varied and unrelated up to now that Colonel Urwick could also observe in his report, "I think there has been a recession in the last decade in clarity of outlook and understanding of simple principles." It might be well, then, to list at least a few of the forces which started the changes in organizational practice before going on to deal with the 1950's in their own right.

To begin with, companies had to cope, at a new level of experience, with size, complexity, and rates of change; some experimented with devices to humanize or improve the efficiency of production lines; others with methods of increasing the productivity of clerical groups; most of them were searching for ways of handling new technologies, including computer technology. Research and development emerged as a national institution; almost immediately research workers demonstrated the impossibility of doing such work within the older organizational forms. Study in human relations and group dynamics tended in part, at least, to reinforce the experiments going on in industry. The military contributed to this benign ferment by presenting industry with organizational problems more sensitive and complex than any with which industry had previously dealt; it also surely enlarged the state of art. Finally, there was the emergence in this decade of business as an institution, the primary economic organ of our society, whose own inner logic could now generate

criteria for the large-scale organizational design-criteria which the prior "functional" approach had been unable to provide.

One should recall the handful of companies which by leadership or example exercised tremendous leverage on the rest of industry in organizational practice. For example, Sears, Roebuck & Co., one of the boldest and most successful pieces of business architecture in our time, presented at almost every turn a working challenge to accepted practice. The Whirlpool Corporation in the middle of the decade began to develop a structure in which one could go from one key action or information management center to another without passing through many intermediaries; in which there were components designed for the autonomous management of products, productive facilities, and customer relationships; in which there were separate organs for the management of the network; and in which the tasks of management research and the management of innovation were at least partially separated from the management of the season-in and season-out business of the company. Throughout the decade American Telegraph & Telephone Company in its quiet, gentlemanly way went on preparing for a less functionalized, fewer-level structure in the operating companies; it worked toward this end both by experiments in those companies and by its program of management education. (It made even more basic contributions to our knowledge of communication-action structures.) At the beginning of the decade, General Electric Company set the tone by creating decentralized business departments, this coupled later with the working out of business charters for each. At the same time it identified top management work as a group of separate tasks with their own organizational requirements. (The identification of executive and services work eliminated from its thinking and its language the old staff-line polarities in which so many companies have been trapped.) Then it identified the "individual contributor," with his separate organizational and career needs.

Probably more striking was the multitude of organizational experiments in many businesses, most of them unregulated and undirected, but most of them also working to a common purpose. From such forces, leadership, and experiments came the particular organizational advances of the 1950's.

Work of Workers—Job Enlargement

The forty-year-old assumption of specialization as a means of attaining organizational efficiency—an assumption which expressed itself in functional forms of organization at the managerial level and in minimization of task at the worker level—was challenged in the first year of the decade by a phenomenon which came to be called job enlargement. The fact of job enlargement preceded 1950, although one must go almost exclusively to International Business Machines Corporation for earlier known examples. But the fact also did not enter the public domain until that year. In May, 1950, Prof. Charles R. Walker described the early IBM experience [6]. In February, 1950, the new integrated units in the sales record department of Cluett, Peabody & Co., Inc., were set in motion [7]. (They are still functioning nicely, and at an even higher level of productivity.) In both these companies the deliberate attempt to reintegrate the jobs of workers, by bringing together skills which had hitherto been separated and by rebuilding into the job elements of self-management and self-control, had achieved dramatic increases in productivity measured by such standards as increase in units of work per worker hour or dollar of pay, reduction in rejects, reduction in elapsed processing time, and upgrading of skills with consequent flexibility of assignment. These increases were extended at IBM, for example, through worker job rotation, or in the experiments with long versus short typewriter assembly lines, a collator [8] production unit, and even the manufacture of the first 700-series machines. Similar studies and experiments were conducted in insurance and utility companies as well as on production lines [9]. There has been a consistent record of increased productivity where jobs were so redesigned. Unlike the Western Electric experiments of an earlier decade, such increases have been maintained without decay for long periods of time.

After redesign most of the jobs were larger in scope than before, so that a reversal had been made of the trend to job minimization. But the realization came early that the real magic lay in reintegrating a number of tasks or pieces of work to be done into a semicomplete chunk or integer, in relation to which it was possible to mobilize the competences required, whether of individuals or of groups, and bring those competences to bear directly upon the work to be done. Many production lines today—those that proceed by pulse rather than unbroken flow, in which a worker or worker-team completes a stage of work rather than an isolated operation, and whose physical appearance is shorter and chunkier than the lines of a past generation—embody such principles of job synthesis.

Job enlargement was discovered by men in business, sometimes working with outside consultants, who were primarily trying to increase the productivity of people at work or reduce the number of rejects and errors. When they had redesigned jobs they generally found an accompanying and measurable and continuing improvement in worker interest and morale. What they had discovered was of one piece with the results of parallel research at university centers (M.I.T., Michigan, Yale, to name three early ones); thenceforth research and practice began to reinforce each other. But at the outset in this instance, as in that of project teams, the first experiments and advances were made by practitioners.

Job enlargement also made possible and intelligible other advances that were to come in organizational practice. When job enlargement was rediscovered in 1950, while we did not understand its principles or implications nearly so well as we do today, still we were aware that we were at last getting at some basic principles and insights about human work. By studying work instead of assuming it, principles of job synthesis had been discovered to complement the techniques of job analysis inherited from scientific management. Such principles, therefore, should also be applicable to the work of managers. Though one did not know what form such a new approach to organization might take, some practitioners in 1950 and many by 1954 or 1955 felt that it would be made; once the practice of organization had been related to the design of work, one could deal with large-scale organization as a problem in large-scale work structure [10].

Teams, Task Forces, Project Teams, Integrated Operating Components

The basic efficiency of the task force as an organizational component was surely known and established long before the 1950's. The Germans maintained steel production far beyond our expectations in World War II by setting up pools of mechanics, engineers, workers with similar pools of machines, tools, and materials at strategic centers; as different plants were bombed, they would assemble task forces from a pool and dispatch them over the network of roads to the ruined plant. Some of the features to appear here—the resource pools, teams assembled by competence mix in relationship to task with their competences then brought to bear quickly and directly on the task, the whole united in a total action-communication network—reappear in industrial organization structures in the 1950's.

But for all such historical precedents the project team and the integrated operating component first entered our industrial consciousness and organizational practice on a significant scale in the decade 1950–1960 again as the result of experiments by business managers faced with the practical problem of getting work done.

Providentially, and in our uncontrolled American way, the number and kinds of such experiment are proliferating beyond the power of itemized description. But there were four important centers from which the developments sprang: (1) research and development; (2) studies to search out companies' own experience, particularly as this was related to manager development; (3) coping with management problems outside of a functionalized structure; and (4) new product engineering.

Research and Development. The following observations apply to product-oriented research, not management research or innovation, and to those developments in research which related to the project team.

In 1950 the number of separate research departments was relatively small. A few types of business had them (for example, chemical companies and ethical pharmaceutical houses); a few companies (GE and AT&T) had been engaged in formally organized research for many years; some university centers existed for this purpose. But as the large-scale creation of R&D centers got under way, as existing ones enlarged their staffs, business had forced itself to be concerned with research, its own organizational needs, and the working requirements of researchers. Business had never before had to do this seriously.

The first thing to be discovered was that pyramidal organizational structures, with many layers of supervision, and with functional division by specialty, simply did not work. The communication chain between top scientific or engineering leadership and work centers was too long for either the scientific or managerial message to be communicated. But in these research organizations where work actually got done, when one studied them he found that whatever the organization chart prescribed, groups of researchers with different competences as required by the problem in hand were working together, cutting across organizational lines; that they were establishing most of their own design criteria for the work as well as their intended patterns of association; that individually or from a working center they arranged to tap directly into more senior sources of competence; and that the patterns of their group association at work followed the organization of their competences as human knowledges.

The total requirements of running a research organization are more than the foregoing. But when one set out to *invent* something, a project group organization with such structural characteristics was the way to do it.

Companies' Awareness of Their Own Experience. When the first companies began in the early 1950's to analyze their own experience with a view to discovering the factors, conditions, . . . that actually contributed to the development of their managerial personnel, they discovered:

(*a*) That managers are formed in a context of work and experience. Such experience at its best requires the developing manager to cross functional lines, to be the center of mobilization for many and diverse competences, and to make optimizing design and operational decisions.

(*b*) That the factors which make for the release of human energies and development of people are the same as make for operating efficiency.

(*c*) That organization or work structure is one of these basic factors.

The richness of evidence thus made available would be difficult to convey. It has not yet been written down, though, characteristically, it has been communicated in part through the many advanced management programs whose appearance was also a phenomenon of the decade. But to list a few examples that relate to work structure:

(*a*) Those blast furnaces and open hearths were the outstanding producers in the early 1950's where a work center like melter foreman was joined directly not only by helpers and crew but also by a technically trained metallurgist, power and fuel engineer, and skeleton crew of mechanics for maintenance of the facility.

(*b*) Similarly, in chemical plants, where the tasks of making the product, managing the facility, maintaining quality, and servicing customers interpenetrate each other, the most successful units were those in which superintendent and operators, chemical engineers and others concerned with process or product, and shop people ran the facility as an integrated group.

(*c*) Petroleum companies found some parallel cases, primarily in "production" (exploration and discovery and bringing in wells).

(*d*) The manufacturing operation of the Large Steam Turbine and Generator Department of GE in its day-to-day operation was organized around six general foremen [11], each in charge of a major stage of process and joined in this by shift foremen, mechanics, and experts on methods, standards, cost, quality, so that each group could function competently and autonomously, for long periods, within the framework of the total operation.

(*e*) IBM, to which the articles on job enlargement have already referred, had developed great virtuosity in bringing new or improved machines into production by the use of project groups [12].

Project Teams for Special Managerial Tasks. Smaller in number, but important, were the many project teams created by industry in this decade. Management might have a special task—for study or action—for example on a matter of plant location, a new technology, the marketing program for a new product, planning for a computer, where existing organization was weak or management was unwilling to incur the losses and delay of forcing action through existing organizational channels. Sometimes the team was created to work with an outside consultant. And in some cases companies took this approach because they had not yet organized for the top management task. But the history of such teams, generally successful, gave some support to the idea and created a large body of practice in how to use this type of small-scale organizational structure.

Product Engineering. As in the case of research and development, those who have worked with engineering groups engaged in genuine design work on new products know that at the working level (which can be quite high) one finds project groups, either formally or informally organized. But the meaning and pertinence of such organizations increased substantially in the 1950's. For one thing, the average level of all engineering competences was substantially upgraded and the number of such competences multiplied. This, we learned, is the condition which demands highly integrated work groups, rapid access from group to group as well as from group to state of art consultancy, with the ability to manage information for the total system.

In the case of engineers concerned with a unique product (a prototype or a few dozen advanced airplanes, computers, rockets, or guidance systems) the organizational forms that succeeded resembled clusters or constellations of project and subproject groups, with design and manufacturing engineering penetrating each other at the phase of transition. Many of these groups also developed organs for the management of information, of space-time, of retrieval of information which may have been primitive but which introduced a new order of organizational practice. The pre-1950 approach to organization had been unable to deal with tasks like the management of information or the management of a space-time matrix, primarily because it was impossible to reconcile the management of such tasks with ideas of authority and responsibility embedded in older organizational assumptions.

In the classic area of engineering refrigerators, washing machines, or TV sets, many companies advanced in the use of project-defined organization; in fact, those that did not, but insisted on isolating design stages from each other, generally paid a heavy charge in engineering costs, delay, poor design, and inability to meet changing market requirements.

But a few leaders went beyond this point to attack in a basic way the classic problem of moving from engineering into manufacturing. Historically, plant organizations developed in America at an earlier date than engineering organizations. And under the influence of the first industrial engineers the plant organization came to include groups concerned with methods, manufacturing engineering, tool and die engineering, and the like. It was much later in most companies that engineering departments with groups of mechanical, electrical, chemical, metallurgical, . . . engineers, concerned with true product (or preproduct) design came into considerable existence. Thus, by tradition, by training (except for chemical engineers), and by established organizational equity, manufacturing was divided from engineering and the problem was created of how to move from one to the other.

A few companies in the 1950's did move to an answer. For if one realizes that an engineering group is not simply designing a paper thing or hand-made model, but something to be made by specific technologies, machines, and methods, and within certain costs, then the latter considerations enter into the earliest design decisions and the corresponding competences must be represented in the project or task group. This is one of the particular advances of the 1950's, ready to use, although it has not entered common practice. But to cite at least one outstanding example, the Whirlpool Corporation by the mid-1950's, starting from the foregoing analyses of engineering work, had advanced to the sophisticated design of a complete productive facility.

Three Particular Items

This is probably the point to take note of three other institutions which emerged largely in the 1950's and which have contributed to either our organizational competence or repertory.

The Product Manager. Product managers were to be found in industry before 1950; a few companies had them in the 1930's. But many such jobs were created in the 1950's largely under the leadership of the Harvard Business School and so represent an organizational center which we can identify better with that decade than with any previous one. Product managers in their actual roles today range from those who make analyses, watch trends, and simply provide some analytical input into the system to those who in a plenary degree are at the management of a product or product group as a marketing and business entity.

Whatever those variations, three things are noteworthy: (1) This job or organ represented a means of providing for the management of a product as a task in its own right. (2) The exchanges between product and customer, on which a business is founded, can take place only in a context of consciousness; it is necessary both to make customer conscious of product and product conscious of customers; the only way to make product conscious of customer (as yet) is to plug a human being into product; the product manager is one means of building into product the consciousness it requires. (3) In an enterprise with many products, concerns, or customer groups, it is sometimes possible to set up a primitive organization for a single business by linking a product manager to a productive facility, some customer contact group, and budgeted money.

The Professional Sales Job. The job of the professional salesman [13] is not new in industry, but it still is rare and far rarer than industry's requirements. The professional salesman often generates sales by not selling. Whenever a sale represents an investment, when sales depend on the management of a long-term relationship, when there may be a strong engineering or technical or consultative requirement as part of the competence one sells a customer, or when a major competence becomes the most important thing one sells, with or without the hardware, then one usually finds the need for a professional salesman. He is a true individual contributor, whose career pattern is often curiously parallel to that of the engineer or scientist with whom he graduated from school. He may also manage something—though that thing is primarily a relationship.

Although some companies—those which sell industrial chemicals, or heavy apparatus, or machine tools—are familiar with the situation, little attention has been paid until recently to the structure of this salesman's job, the rhythms of his work, the tools he needs, or his role as center and transmitter of other organizational forces. (The standard answers of supervision, incentives, territorial assignment do not fit him at all.)

IBM—long experienced in professional sales work (this was one of the original design elements of the business)—has begun to experiment with a sales task force composed, for example, of linked salesmen of different competence levels and of experts in the knowledge of handling information and of systems design, which can function as a deployed, autonomous team.

One should keep his eye on this.

Management of a Productive Matrix. Most people by now have heard of the technical advances that have been made in the ability of computers to handle large volumes of information rapidly and in the ability through mathematical or mathematical-type techniques to optimize among many variables, given the parameters. The optimum loading of a plant, determination of product mix through production, and the management of materials in relation thereto, have become concert pieces which many management scientists can perform. But few, including members of top management, realize that such techniques (and equipment) cannot be applied well or enough because the organizational means needed for their functioning generally do not exist.

Some breakthroughs have been made [14]. In those instances the pattern of thinking was somewhat as follows: One may start with an integrated facility, whether this be represented by a single plant or complex of plants, which contains all the capabilities necessary to bring the product into complete physical existence, given the marketing and business decisions which will have set the parameters for that product or product group. Frequently one will find two kinds of tasks or at least two stages of a task; bringing the product into complete design existence, as demonstrated by its manufacturability under real or simulated conditions of manufacture, and then bringing the product into complete physical existence at whatever geographic point it must be made available to the customer. When these tasks appear separately, they require separate if related organizational approaches.

But there is also a third task—the management of the matrix itself. The matrix consists of a set of spaces more or less flexible [15], intersected by time variables which have both rate and duration. At each intersection is located a productive capability—the ability to hold, store, move, alter, modify, reject, . . . something; that something, the material which occupies the same intersection of space and time, may be either a physical object or information or both; the capability, qualitatively described, has also a quantitative dimension and a cost dimension [16].

At this moment in many companies, whether there be single or multiple plant operations, the ability to use their computers or mathematical-type optimizing techniques, is strictly limited by there being no organ for the organization of capabilities, materials, and information in the space-time matrix, either in the single moment of their conjunction or architectonically in regard to the whole.

The first design work on such organs was begun in the late 1950's. Credit for actually having done it will have to go to the forthcoming decade. But the competence in organizing for the management of a matrix is one of the competences needed right now for the management of a business; and we have already begun to design the first structures to do this.

Contributions of Government

Many advances in organization parallel to the foregoing were made by government [17]. One of them, however, was so outstanding and so different that it deserves special mention, the Navy's Polaris project.

It is a matter of common knowledge that Polaris is coming along nicely and well ahead of schedule. Some standard observers of the government situation as well as old line experts in administration grudgingly attribute this success to the special attention which the project has received or the personality of Rear Admiral William Raborn. These facts, of course, are true. Other projects at the same time have received similar attention, spent more money, and succeeded less.

The secret of Polaris, available for all to observe, is an organizational secret. A separate organization, nonfunctional in character, was set up to carry out an integrated task. All of the integrated competences necessary to do this were brought together regardless of prior functional loyalties.

Its center was a constellation of project groups organized in terms of the particular competences required to make design decisions for subprojects or stages of project. At different stages of work, these project teams interlocked—are interlocking—with contractor and subcontractor groups. Whatever the organizational naivete of those contractors may be, the validity of Admiral Raborn's core organization requires of the contactors at least some paralleling integration of forces. Within the core project teams, and thence among them and contractors, there was organized a communications network with direct lines between any two action, decision-making, information-generating centers. The total information for the system was available in a master information center to which every action group had immediate and plenary access; this central organ, in structure, sophistication, and method, should be related to the organs for the management of space-time capabilities to which we have already referred.

Finally, Polaris set up two independent groups, neither on the Polaris payroll. One audited state of art on a regular basis; it simply sifted current science and technology to see whether everything pertinent to the project was being used. The other audited the communications network by sampling the transmission of messages throughout the system.

The foregoing elements are all structural. They embody the new or emergent principles of organizational design. When diagrammed, this organization resembles none of the organization charts with which everyone is familiar. But it does show what business organizations of the future may look like. And Polaris is ahead of schedule.

Inputs From Human Relations and Social Sciences

Other contributors to this report will take note of advances that have been made in using material from the social sciences in the work of running a business and in our understanding of the managerial process. This paper, therefore, will simply reflect on the manner in which one group of professional workers in these fields, particularly in the universities, has contributed to organizational practice.

One must begin by recalling the work of Kurt Lewin, particularly in his last period at Massachusetts Institute of Technology in the late 1940's. For he was establishing both methodology and insights for getting at structural problems, and doing this with technical elegance and rigor which could surely be models for people working in those fields today. He was actually getting at dynamics of a structure, not simply talking about it. Those who talk much today about quantifying organization structure have made little use of the topological methods he suggested and which would seem to be appropriate. In any event, either as a symbol or as a teacher, he stands at the beginning of the sequence of social scientists whose original professional training may have been in any of several fields (psychology, sociology, anthropology, . . .) but all of whom were united in the study of people at work. And because they were good observers and good analysts they kept running into, analyzing, and describing the same relationships between work structure and the productivity of people with which people in management had been experimenting.

This work fanned out from M.I.T. to the University of Michigan, the University of California, more recently to Columbia University, radiating from these centers to further points; and the work is now building up in strength at M.I.T. for a new era. Without attempting a complete list of achievements, one can still easily recall the work of Prof. Alex Bavelas on the work and communications structures of small groups; Prof. Mason Haire on the relation between size, shape, and function; Prof. Rensis Likert and his associates at Michigan on the comparative efficiency of similar groups but with different organizational and authority structures; Profs. Leonard Sayles, Don Marquis, and Leo Moore, on the similar relationships between different work structures and the productivity of people at work; and, of course, Prof. Douglas McGregor on the relationships among all the foregoing and the problem of running a business organization with highly functionalized groups, line-staff relationships, and the like.

As the result of the work of these men and their professional associates of similar inclinations, there has been developing through the 1950's a substantial body of knowledge about men at work, the findings of which dovetail strikingly with the other advances reported in the foregoing.

One must also take note of an important book by Prof. Chris Argyris [18]. Professor Argyris's contribution has been to make a critique of traditional organizational structure, with their accompanying systems of authority and to show how the traditional approach to job design and organization structure is creating a disaffected national work force. His work, however, has not gone to the point of showing the conditions under which there may be a beneficial relationship between work structure and the life of the individual.

One of the last contributions in the decade was made by Professors March and Simon [19] in their attempt to bring within one synthesis many pieces of research and discovery about work, communications systems, and social structures. It is far from a summary, and therefore from a synthesis, of what we have learned about organization in this decade, primarily because they are working from published sources and the major evidences do not yet exist in that form. But in their attempt to identify organizational variables, and to deal with these as they occur in decision-making and communications, they have produced a body of knowledge which none can afford to neglect.

Large-Scale Design

The work thus far described challenged successfully almost the total pre-existing practice. It did this at a moment when the previous organizational approaches to both the work of workers and the work of managers could no longer meet the requirements of business. Then throughout the decade experiments were carried out with a wide variety of structures new in design and appealing to different principles. Within those structures were designed new organs, as for the management of information, or the management of a matrix, or the management of a network. Implicit in the new structures was the realization that the prime organizational criteria must be taken from the nature of the work to be done and not from external assumptions about function, authority, or the like.

But all of the foregoing advances were related to the small-scale design of work structure, whether one was dealing with a small

group in an office or a large, integrated engineering-manufacturing facility. Yet many of the same principles should be applicable to the design of top management work and to the organization of the total business, if one could identify the nature and requirements of this latter type of work.

Providentially during the 1950's, for the first time in several decades, parallel advances were made in understanding the nature of a business and of the managerial process. The emergence of a modern business, which many have described as the dominant institution of our society, was a post-World War II phenomenon. In contrast with previous institutions which performed limited roles in a national economic system, business became the primary organ in our society for the creation and management of wealth. Since wealth is generated not by production or any other functionally defined operation, but as the net effect of the total system, the task of the design and management of the total business now appeared with a specificity and separate identity which had not been recognized before. It thus became clear that there is such a thing as top management work with its own array of tasks and that such work cannot possibly be part of what a vice-president does when he is operating as the head of a functional pyramid [20].

Those top management tasks include:

1 The design of the business and of all the separate businesses which may be included in its structure.

2 Optimization of corporate resources.

3 The management of perpetuity. (Management education is part of this task since it looks to the creation of a managerial group, advanced in prudence as in managerial competences, flexible and ready for the needs of the enterprise at any point in the future.)

4 The management of innovation.

5 Keeping the business relevant to the culture, society, polity world in which it functions.

6 As springing from the design and goal-setting activity, keeping the ends of the business and its conduct well related to those larger ends which lie outside itself. (Cf. the social and political responsibilities of business leaders.)

At the very beginning of the decade General Electric Company recognized this requirement and in the organization of the executive office and the services components made the first advances in this part of organizational practice.

It would be impossible within the framework of this paper to give one representative example, much less several, of the new business structures actually in design, if only because widely differing degrees of progress have been made in developing the separate structural components. Again, the new structures seem to present more variety than their predecessors because they are being designed more closely to match the requirements of carrying out the particular tasks within a given business or business complex. Nevertheless, certain common design features can be described.

The older, many-layered, highly functionalized organizations were characterized by the separation of thinking from doing; thinking was generally allocated to the top rather than the bottom of the pyramid and to "staff" as against "line" components. Whatever the wishes of the company about the decentralized exercise of authority, authority inexorably gravitated toward the top of the structure. There was created a numerous middle management class, spread over an indefinite number of supervisory layers whose actual role, as many work studies showed, was predominantly the passing of information through the system [21]. The top management tasks (for example, the management of the business) were not distinguished in any way from the top operating tasks.

The new structures reunite thinking and doing at every level, or better, within every work center organized for the performance of an integrated task. This in itself gave the final and valid meaning to decentralization. For decentralization thus came to mean more than "breaking big ones down into small ones" or the naive answers to such impossible questions as, "Should one decentralize by product, or geography, or customer, or . . .?" [22]. Instead it meant building into each self-contained work center the authority [23] and validity for doing that work as represented by the array of competences and the self-determination and self-control necessary to do it and do it well. These are the primary organizational cells or building blocks, as many, as variable in size, as permanent or transient, and as variously skilled as the tasks themselves require. Some of the cells are designed primarily for doing or making things, others for innovating and organizing invention, still others for managing information. Others again are concerned with the management of the total network, setting up such alignments or articulations among the various components as are necessary to create the management of single businesses or optimize among such businesses.

1960

As we appraise our position at this moment, the advances of the 1950's, radical and great as they were, have simply put us in the position where we are ready to do the work of the 1960's. For we know now that we shall have to design immediately larger, more complex, more flexible structures for businesses in which there will be vastly greater numbers of skilled individual contributors, in which machines or automated systems will be largely used as productive forces, and in which generally the intelligence and freedom of men at work will have to be designed into, not out of, jobs. The foregoing developments have made it possible for men of imagination and sophistication to do this.

We have learned a great deal about the design of integrated, multiskilled cellular structures, the design of communication networks, and the like. But now that the breakthrough has been made, there is a great deal to be learned from the microbiologists, or independent scientists like Père Taillhard de Chardin, about the nature, types, and functioning of structures.

Peter Drucker in December, 1958, expressed the belief that the organizational forms of the future will follow the organization of human knowledge. Indeed if one reflects on the kinds of work that human beings will be doing in a business, the tremendous need of business today for all kinds of competences and the fact that the first discoveries of the 1950's showed that the efficient work structures related to the requirements of work organize the immediate flow of competence to work—then there can be no more basic principle of organizational design than the one Peter Drucker suggested.

The shape of such structures, their dynamics, and the creation of roles within them will be simply different from what has been described in the older treatises on organization. The manner in which they will be filled with authority will be different, and the institutions and modes of exercising authority will be new.

But it is also likely that the change will come without any general feeling of shock or awareness of the new; for the change is already under way. We went through the 1950's, in which there was a real revolution, without having been conscious of anything more than the individual steps in the change and the opportunity at which we all were working.

Notes and References

1 In this paper "organization" always refers to the structural element of work. The earliest research of the 1950's showed that, among the many factors which influence the productivity of people at work, two are primary, structure and rhythm. Structure in work is parallel in a sense to structure such as an engineer or a physiologist considers in the course of his inquiries. The fact, for example, that

there are certain bones in a man's leg (femur, tibia, . . .) with their related muscles and nerves, that the femur articulates in a certain manner with the pelvis, govern the fact that the man stands or walks erect, generally moves in a forward direction, with certain gaits, and within a range of speeds. The same is true of the structural element of work in relation to the fact that work gets done and the manner in which it is done.

In the case of an individual or a group, the structure or organization of work may be described in terms of the array of tasks to which they set their hand, the manner in which the necessary various competences are mobilized for the doing of the work, and, where appropriate, the relationship of worker with tools and to workplace to the work to be done. In the case of group work, and outstandingly the work of managers, structure must also be described in terms of the action—communication network in which the workers are located, with its own dynamics of information flow and decision-making.

In this paper therefore we shall always be thinking of organization as the structural element of work although the greater part of the discussion will be devoted to the work of managerial and professional people in designing and running a business enterprise.

2 Since "delegation," like "planning" or "decentralization," are such favorably accepted words, I should like to point out that the process of delegation in the older literature on organization to which I have referred, does not bear much relationship to: (*a*) Telling somebody to do something; (*b*) persuading someone to assume initiative and autonomy in performing an integrated task (cf. "Overcoming Obstacles to Effective Delegation," by W. H. Newman, American Management Association, New York, N. Y., 1956); or (*c*) designing a work structure to incorporate such initiative and autonomy.

3 E.g., "Effecting Change in Large Corporations," by E. Ginzberg and E. W. Reilley, Columbia University Press, New York, N. Y., 1957. Mr. Reilley's many friends and associates can testify to his deep concern throughout this period in helping members of top management understand and cope with the human problems of change.

4 When authors of textbooks or consulting reports spoke of the importance of keeping the organizational structure up to date, almost invariably they had in mind the mechanics of maintaining a set of job descriptions and of reflecting on the published organizational charts those minor changes necessary to express the current state of stasis. Few, if any, would think of the dynamics suggested by Kenneth Boulding's statement that organization is a "structure of roles tied together with lines of communication." Cf., "The Image; Knowledge in Life and Society," University of Michigan Press, Ann Arbor, Mich., 1956, p. 27.

5 "Management and Organization," by L. A. Allen, McGraw-Hill Book Company, Inc., New York, N. Y., 1958; "Planning and Developing the Company Organization Structure," by E. Dale, American Management Association, New York, N. Y., 1952; "The Staff Role in Management, Its Creative Uses," by R. C. Sampson, Harper & Brothers, New York, N. Y., 1955; "The Pattern of Management," by L. F. Urwick, University of Minnesota Press, Minneapolis, Minn., 1956.

In the afore-mentioned lectures at the University of Minnesota, as in a number of his English publications during the 1950's, Colonel Urwick kept working to show how the concepts of organization he had previously described could be enlarged to include the dynamics of a business and of the managerial process. In the course of this attempt he threw new light on those dynamics, their description, and occurrence.

6 "The Problem of the Repetitive Job," by C. R. Walker. *Harvard Business Review*, May, 1950, pp. 54–58. For the name "job enlargement," as well as for many initial insights into its meaning, all are indebted to Dr. Dwayne Orton of IBM.

7 Part of this work has been described by Albert Fernald in a thesis for the master's degree in the School of Industrial Management, Massachusetts Institute of Technology.

8 Cf., "Job Enlargement," *Wall Street Journal*, March 11, 1954.

9 Cf., "Increasing Office Productivity Through Job Enlargement," by J. D. Elliott, American Management Association, Office Management Series No. 134, pp. 3–15; "Some Views on Job Enlargement," by E. A. Robie, Supplement to LOMA Bulletin, November 15, 1954; "Current Job Design Criteria," by L. E. Davis, R. R. Canter, and J. Hoffman, *Journal of Industrial Engineering*, March-April, 1955, pp. 5–8, 21–23; "Job Design and Productivity: A New Approach," by L. E. Davis, *Personnel*, March, 1957, pp. 418–430.

10 This paper is focused primarily on the structure of *human* work, excluding the work of animals (e.g., executive monkeys, pigeon inspectors, space-exploring mice) and of machines. But it is interesting to observe that the new machines—truly automated plants, computers, general purpose machines capable of complete and flexible programming for different tasks—embody design principles which present striking parallels to the new organizational principles which emerged in the decade.

11 Though they have since been renamed "superintendent" (and appropriately), I prefer to use the 1953 name here in order to convey the immediacy of members of the group.

12 This is probably the best place to recognize the communication of Prof. Gordon B. Carson of Ohio State, who cites Industrial Nucleonics Corporation as advanced in use of task-force organization, within which persons of different intellectual capabilities and experience are united, then disbanded and reassembled in a different configuration.

13 Regretfully, one finds sales-marketing among those areas of businesses in which least organizational progress has been made. The typical sales organization remains tribal, withdrawn from the business, its activities not organized to articulate with those of the business, and with little realization of the work of the salesman as an individual contributor. One says regretfully, because the opportunity and the need are so great.

14 One may cite the master unit at Whirlpool Corporation, headed by their Manager of Facilities Utilization and Performance, and the methods developed by operations analysis and synthesis and employed by a similar group in GE's Appliance Park. I know of two chemical companies, one large, one small, which have made substantial progress. And, of course, there is the new control tower at Newark Airport, in which computer technology has been married to an organization for the management of space-time-movement.

15 It will not help to visualize a plant as a semifixed array of machines and processes ("plant layout"). For the new machines, like the programmed machine for producing muffler tailpipes or any of the new, general purpose machine tools, and the allied new methods of programming, have so reoriented our handling of productive capabilities that we may actually make new plant layouts from day to day or hour to hour or even item to item.

16 "Cost" is here defined as the dollar equivalent of doability of the operation.

17 Among all the suggestions submitted to the editors of this report, only one—that from Ralph Currier Davis, management counsel and professor in Ohio State University—had mentioned a contribution by government. Professor Davis instanced the Koppers' control section developed under the direction of General Brehon Sommervell. The work of General Sommervell and his many former associates now in industry represents some peak of thinking in the 1940's. Such advances as they may have made then, the effects of which may still be with us, are simply different from the work on organization which began in the 1950's. But this would be a good place to recognize Professor Davis's own contributions to our understanding of the managerial process. These contributions, which were made in the 1950's, have influenced significantly the structure of top management work and have thereby put all in his debt.

18 "Personality and Organization, The Conflict Between System and the Individual," Harper & Brothers, New York, N. Y., 1957.

19 "Organizations," by James G. March and Herbert A. Simon, with the collaboration of Harold Guetzkow, John Wiley & Sons, Inc., New York, N. Y., 1958.

20 Two of the contributors to this study, who themselves did much to bring about this change in the decade, have noted this development in their communications to the editors, Harold F. Smiddy and Peter F. Drucker. Drucker, for example, says, "Top management has emerged as a specific function and its work as a specific generic work rather than as the highest level of operating work."

"Top management continues to be the least known, the least studied, and the worst organized part of management. But a beginning has been made in that it has now become clear that top management has to be studied as a specific function rather than as an extension of supervisory or functional work. We are now beginning to understand that it has a specific and separate focus: the whole of the business enterprise, that is the *result*—where all 'functional' work only produces *costs*. We are now beginning to understand that it needs its specific knowledge, its specific information, and its specific skills. We are beginning to understand that it has to be organized like any work—indeed that it is work of its own kind. And we are therefore beginning to come to grips with the questions of the nature, the tasks, the results, the performance standards, and the qualifications for top management."

21 It was for this reason that the authors of a now famous article predicted the disappearance of middle managers as an industrial class. The ability to handle the total information for a business system completely, rapidly, and with random access has been made possible by computer technology at the very moment when middle management, because of its size and clumsiness, can no longer perform this task. Cf. "Management in the 1980's," by H. J. Leavitt and T. L. Whisler, *Harvard Business Review*, vol. 36, November–December, 1958, pp. 41–48.

22 In his communication to the editors of this report Mr. Harold F. Smiddy gave as the first item of progress in the 1950's, "Wide Applications of the Principle of Decentralization of Decision Responsibility (as distinct from mere geographic decentralization or even decentralization by separate products or product lines)."

23 As a result of its new insights into the nature of work, business is beginning to rethink the nature, occurrence, and uses of authority. For whatever the ultimate origin of authority, or the legal requirements for observing its occurrence, the modes and shapes of authority correspond to the modes and shape of work itself. Cf., such widely differing writings as "The Source of Managerial Authority," by Cyril O'Donnell, *Political Science Quarterly*, vol. 67, December, 1952, pp. 573–588; "Work and Authority in Industry," by Reinhard Bendix, John Wiley & Sons, Inc., New York, N. Y., 1956; "Freedom, Authority, and Decentralization," by B. E. Kline and N. H. Martin, *Harvard Business Review*, vol. 36, May–June, 1958, pp. 69–75.

DISCUSSION

Mary Cushing Niles[3]

I would like to call attention to American export of management know-how to underdeveloped areas which need the most modern and progressive techniques for "catching up." In parts of Asia and Africa, old social systems are breaking up under the impact of modern technology. Ideas of authority which have been superseded in the West are not useful to them. How are we to revise our management know-how packages so as to minister to their needs fast enough?

[3] Management author, Baltimore, Md.; for some years Assistant to the Chairman, Federal Personnel Council, U. S. Government; former president, Washington Chapter, Society for Advancement of Management.

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Practices in General Management—Financial[1]

Factors of Economic Environment

FINANCIAL management cannot exist strictly on its own, but exists only in relation to the other facets of management. Nor can the practices of financial management develop in an independent world; they must come to life only in support of the general management of production and commerce and flourish only when they add a definite contribution to the success of business in general. As with so many things, the progress of financial management during an era must be measured in terms of its environment during that period.

Directly or indirectly, the practices of financial management have been influenced overwhelmingly, if not dominated completely, by the economic factors and environmental aspects of the national and international conditions of the past decade—a period of almost unprecedented world-wide prosperity marred by attendant inflationary conditions. The degree of inflation and the level of prosperity may be subject to varying opinions, but the great consensus is that the era was one of long-term industrial and national expansion. The economic environment was characterized by the spiraling cost of doing business reflecting the increased cost of labor, capital, and government. Indeed, a previously unbelieved high level of psuedo peacetime taxes, a fluctuating, but increasing, cost of capital, and an unending climb of the cost of wages have been the key factors in the economic environment of the period. Progress in financial management must be judged accordingly.

Cost of Government. Taxes have had a paramount effect in personal and business considerations, creating new practices in the field of financial management. Today management can neither leave taxes solely to the company's tax man, nor follow the traditional approach of calling in the outside professional adviser to dispose of the corpse after the deed has been done. It may have been satisfactory, when tax rates were low and easily absorbed, to leave the tax work buried in the Accounting Department. But the Korean War's 52 per cent rate established by the Revenue Act of 1951 for the business income tax has changed that, and tax planning has become as much a tool of management as budgeting and cost accounting. Tax planning by management is required at the inception of a course of action and must be given continuing consideration throughout the formulation and execution stages. Taxes are half the net, not a mere percentage to be applied to net before taxes. The tax collectors are the majority stockholders in distribution of the excess of revenue over expenses.

When it can be said that a $1 tax saving is equal to $20 in sales, management can no longer shrug at the fatalistic certainty of taxes. Instead, corporate time and attention must be given to the study of the tax consequences of each business decision. To accomplish that, tax management and tax accounting must be organized and well planned. It can be said, "If you don't know taxes, you cannot manage." Thus to the already complicated decisions of general management comes this new facet with definite and direct financial implications.

Cost of Capital. Although capital funds have been readily available during almost all of the past decade, fluctuating and increasing interest rates have made the timing of the use of capital a real problem for financial management. The government's policy to tighten money quickly at the height of booms even at the risk of deflation is clear evidence of the great concern with the dangerous surges of inflation. This and the alternate loosening of government control at recessionary points have brought to management the problem of dealing with the fluctuations of the discount rate, margin requirements, and other money and banking controls and the resulting changes in the interest rate. The end of the decade witnessed the highest prime rates confronting management for as long as most can remember.

Management has had to face either making more expensive capital expenditure decisions at times of high interest rates or, conversely, making these decisions at lower interest rates but proceeding at a time of lower business levels.

Cost of Manpower. The manpower requirements in this period of prosperity and inflation, coupled with the concurrent climb of labor costs in negotiated wages, have raised production and operating costs to a point where manpower economies were necessary in order to survive. Indeed, concern has been expressed that industry may be forced to price itself out of the market.

By the end of the decade grave concern had arisen over foreign competition. In countries where we have superimposed modern management on low-cost-labor markets, competitive products have come home necessitating increased emphasis on labor-saving devices.

The term automation, coined independently by Del Harder and John Diebold, has been the order of the day. Automated control systems have been required to supersede manual operations in order to counteract the cost of manpower and to achieve greater capacity, speed, and efficiency in production.

Interdependence of Various Factors. The three categories of increased cost—taxes, labor, and capital—are interdependent. Their interaction, together with the individual effects of these and other factors, has given birth to a host of new financial practices in management during the past decade. Only a few can be described fully enough to be much more than identified. Many have required the scope and nature of individual books to achieve adequate coverage. Furthermore, no attempt will be made to justify their listing under the "Progress" except to intimate that they were new and current, and that they were developed under the economic conditions of the period.

The influence of increased costs to industry, the demands of the population explosion, and the conversion of the fruits of military research and development to industrial applications, all constitute important factors in the growth of significant financial practices in management.

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[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

Contributed by the Management Division and presented at the Winter Annual Meeting, New York, N. Y., November 27–December 2, 1960, of THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Manuscript received at ASME Headquarters, July 26, 1960. Paper No. 60—WA-66.

New Practices in Financial Administration

Dilemma of Capital Recovery. The economic environment together with the technological advances of the age have created the dilemma of recovery of capital investment. Even when or if original capital is recovered, its complete inadequacy for equipment replacement because of inflated price levels has failed to meet the cost of just staying in business, much less meeting expanding requirements. For this reason, the terms cash flow, cash forecasting, depreciation, rapid amortization, accelerated charge-off, lease financing, and rent or buy have become permanent features in management's financial handbook.

The Cash Problem. Under the tax regulations and accounting procedures, certain expense items and income may be and frequently are given different treatment in computing taxable income from that given in computing profit for the accounting period. This situation has placed such importance on cash forecasting and cash-flow computations that such techniques have become important adjuncts to budgeting. Without attempting to elaborate or describe them further, such advances are cited as significant financial practices in the 1950's.

Depreciation Methods. The importance of the cash flow generated by depreciation cannot be overstated. It was recognized during the first half of the decade by the government's concession in approving rapid amortization for approved defense projects *in toto* or for a specific percentage thereof. The importance, if not the necessity, of better depreciation rates was recognized on a continuing basis in the Revenue Act of 1954 which permitted accelerated methods of depreciation, specifically, the declining-balance and the sum of the years-digits methods.

The particular advantage from faster depreciation methods is the faster write-off of newly acquired depreciable properties, generally in the order of $^2/_3$ to $^3/_4$ of the original cost of over the first half of their useful life. It should be noted that this is not tax forgiveness, but merely tax deferral.

Accelerated methods are sometimes used for computing income taxes but, for one reason or another, are not used for computing profit for the same period. Thus, for a time, larger depreciation amounts are claimed for tax purposes than are shown in the books. This is followed by a period during which the reverse is true, the lesser tax being paid during the early life of the asset but a greater level of taxes being due the remainder of the life.

The declining-balance method has had a successful history in English accounting procedures. Theoretically such a method is generally best applied to assets on which the earning power tends to decline with the age of the property; for example, machinery where maintenance costs increase with age. Thus the increasing maintenance with decreasing depreciation charges tends to equalize total expense charges to lend stability to profits. Of course, when the method is applied to a multiplicity of assets whose replacements have been spaced out over a long period the total depreciation charges tend to be equalized and usually are the same as the traditional straight-line method.

The declining-balance method never completely amortizes the cost of an asset, and when the balance would exceed the salvage value it is necessary to switch back to the straight-line method which is permitted by the law. A change from the sum of the years digits is not permitted without Internal Revenue's approval.

The financial practices may be quite significant in view of the tax plan when the accounting and the financial reporting variations are considered.

Unfortunately, although providing some benefit for expanding companies, accelerated depreciation does not meet the problem of inflation. Acceptance of LIFO[2] on depreciable assets is needed for the same protection, that its adoption has afforded heavy inventory investments.

[2] "Last-In-First-Out" inventory accounting method.

Management Problems—Lease, Purchase, or Make. Lease financing is not really new, but in our recent economic environment it has assumed a major role in supplementing or, in some situations, actually replacing the traditional equity financing and purchase of assets. Capital assets financed by leasing have been characterized as "rented capital" but, however regarded, the method has added an additional approach for raising capital.

Although at one time the terms "sale and leaseback" and "lease financing" were confined mainly to real estate, it now appears that any type of capital asset may be rented within the patterns already well established for trucks and automotive units, railroad cars, oil tankers, heavy production equipment, aircraft engines, and others. Even the Federal Government has succumbed to this program by renting Post Offices throughout the country, completely breaking the old test of permanency as a criterion for buying rather than renting. One of the largest U. S. corporations in terms of assets holds no new property in ownership but utilizes the leaseback procedure completely. Of course, in the office-equipment industry computers are almost always rented.

There is no doubt that "sale and leaseback" has been popularized with the hue and cry: "Why buy a cow when milk is so cheap?" The chief attractions are (1) a gain in working capital and capital for business expansion, and (2) improvement on corporate tax deductions. A valid leasing arrangement permits a company to charge rental payments as expense over the basic term of the lease. This may exceed the depreciation write-off rate, particularly if an accelerated depreciation method is not being employed. The result is not actually a tax saving but a shift in the timing of deductions and tax payments similar to the effect of accelerated depreciation. To the extent that tax payments are deferred, the company benefits by having the use of these funds for the additional period of deferment. Also, leasing makes it possible to write off land values against taxable income, a practice which is not allowed for depreciation purposes. The effect can be quite significant where land is a substantial portion of the total investment, although this may or may not be an advantage.

Much has been written concerning the pros and cons of leasing. Unfortunately, some of what has been written, and widely read, has been presented by persons who are in the business of leasing. Others have been more critical; and as Donald Gant[3] concludes that, in some cases, the illusion of lease financing offers the lessee, "the rather questionable privilege of being able to abandon a property it has already paid for."

Where the flexibility of a lease actually provides flexibility, where a tax advantage is offered for current, complete write-off to expenses, or where the freeing of capital for more lucrative investment is helpful, leasing may be the answer which should receive the call over purchase. In any event the "theory of present value" must be considered in establishing a true rate of return of investment versus the over-all cost of leasing. Management must determine that the price is really, not just apparently, cheap.

Professor Anthony[4] and others have developed procedural formulas and tables for determining the relative merits of purchase versus lease. Computer manufacturers have developed computer programs and routines which, with information peculiar to the customers' tax and other variable factors, calculate the payout period for various situations.

Today in more versatile industries management is confronted with the multiple question of "rent, buy, or build."

[3] D. R. Gant, Underwriting Department, Goldman, Sachs Company, "Illusion of Lease Financing," *Harvard Business Review*, March-April, 1959.

[4] R. N. Anthony, Professor of Business Administration, Harvard University, Anthony and Swartz, "Office Equipment—Rent or Buy?" Management Analysis Center, Inc., 1957.

Again, no position has been taken as to whether the current enthusiasm for leasing is real progress in financial practices or whether it is a passing fad. Financial experts, accountants, tax men, and management in general have voiced many views ranging from full acceptance to blanket denunciation as a snare and delusion. In any event it is a new tool for management, and one that must not be ignored in view of the high cost of capital and taxes.

Discounted-Cash-Flow Analysis. Considerations of the capital programs cannot be dropped without further comment on the present-value concept and employment of the discounted-cash-flow analysis to the evaluation of capital programs.

Discounted-cash-flow analysis is one of several analytical methods used to compare investment opportunities with appropriately defined costs of money. In essence, the anticipated cash flow of the projects under evaluation is discounted, thereby giving weight to the timing of cash flows. This is done either by calculating the present worth of the expected flow at appropriate interest rates or by determining the interest rate which will discount the cash flow to zero.

By applying discounting techniques to a program of operations in which a series of financial outlays and incomes is reduced to a single present worth, management can see more clearly that *buy* alternatives are sometimes the better course of action.

Dickson[5] of Indiana University has outlined how utilization of this technique reshapes industry's handling of capital planning. He is of the opinion that the total effect both within and without a company can only be favorable.

Industry Mergers and Acquisitions. Most acquisitions and mergers are made solely to satisfy the bigger and better concept and the natural and quite understandable desire to grow. Some mergers and acquisitions of the past decade, however, have been part and parcel of management's "buy or build" problem and the relative advantages alternate methods of expansion. Too many mergers though have been without real concern for proper development of the managerial talents of the purchasing company but were consummated merely for what appeared to be a "good buy." Other mergers have been completed almost solely for the acquisition of managerial talents to help in the consolidated firm. This has been particularly true in the case of vertical mergers to integrate corporate operations.

Many acquisitions and mergers have been the result of mutual tax advantages to seller and buyer. It has been difficult not to be startled when one hears of a twenty million dollar tax loss up for sale and the accompanying competitive bidding created. The level of taxes and the use of tax laws for loss carry-back and carry-forward have offered a strong motivation for consolidations.

Some situations make attractive merger or acquisition possibilities in providing depreciation base, thereby generating cash flow out of the immediate hands of the tax collector.

Compensation Devices. The level of taxes has given rise to an effort to compensate employees through means other than direct wages or salary. It has been a major factor in the tremendous extension of pension plans and other company employed benefits, such as group life, accidental, medical, hospital, and catastrophe insurance where the industrial employer shoulders between half and the entire cost. Corporation taxes, coupled with high personal income taxes, have been a motivating factor in the development of executive compensation plans including deferred compensation contracts, stock-option programs, and other tax minimizing approaches to remuneration for personal services.

The level of labor costs influenced the consideration of new and extended wage-incentive plans. Among these are profit-sharing plans, suggestion awards, and cost-reduction plans. The main purpose behind these plans is an effort to increase production with available facilities, to stimulate ideas and methods of improvement, to encourage development in individuals, and to restore teamwork and a feeling of security in employees, as Phil Carroll outlined in the previous report on Ten Years' Progress in Management (Wage Incentives).

Although these practices cannot be more than enumerated, since each would require more space than is available, they should be listed among the new practices in general management which have strong financial overtones.

[5] R. R. Dickson, Jr., University School of Business, Indiana University, *Business Horizons*, Spring, 1960, issue.

New Tools of Financial Administration

Office Automation. Electronic data-processing, which brought into the office the ability to automatize clerical operations comparable to automation in the plant, was a natural development of the availability of electronic computers and the pressures of the various economic factors of the period.

During the 1940's computers existed only in the scientific laboratories and for military applications. Electronic circuitry similar to those of radio and television had been developed to perform numerical calculations and other logical operations involved in the handling of data. The advantageous adaptation of this to business data-processing appeared quite speculative and the possibility of achieving automation in office work and clerical functions was only conjecture.

In the decade of the 1950's, however, the cost of manpower plus the ever-increasing clerical work load converted the speculations into a compelling interest for the utilization of computers for office work. Then, with the advent of the original Univac, a whole new industry was born. The computer's incredible speed, reliability, capacity, economy, and simplicity of handling of business information had been achieved.

The rapidity with which computers were subsequently incorporated into business management is too well known to be documented here, as neither the scope nor the extent of computer usage throughout the business world could be described or even adequately enumerated. It is sufficient to mention that payrolls, inventory records and control, managerial reporting, manpower utilization, cost distribution, customer billing, and many specialized accounting problems, as well as general accounting, are being handled with computers. Early successes and graduation from the applications' approach led to much more refined systems and truly integrated data-processing with resultant management information flow.

Savings in clerical costs, as well as the speed, efficiency, and economy of producing current and timely information for management, have been truly significant. Management-information flow has taken on new parameters due to the timeliness of analysis and reporting; and "management by exception" has been extended greatly by the selection and evaluation potential of computer-processing. Management's decision-making responsibilities have been enhanced greatly by a new tool.

The significance of this progress in management during the past decade is best attested by the fact that such a large percentage of persons from industry and universities who, in replying to Co-editors Sizelove and Anderson, cited the use of computers as one of the important new tools of the business world. The volume of material published on this subject supplies incontrovertible evidence of the tremendous progress. While from time to time references are made to the over-emphasis on computers and to instances of over-equipping or under-utilization of business computers, these have been the growing pains which occur in the development of any new technique and cannot be considered as detracting from progress in management.

One of the newer aspects in the computer field has been in the introduction of several techniques for automatic input to computers, greatly extending the utility and efficiency of office systems and data-processing. Technological advance in the area of automatic sensing devices is on the threshold of a major contribution.

With respect to magnetic ink, the acceptance of its use with the standardization of characters throughout the banking industry is truly noteworthy. With respect to optical scanning also, the use of such equipment in large clerical operations is indicative of major economies still ahead.

Other Advances in Techniques. Computers not only provided a direct attack on clerical operations but also brought the ability for more sophisticated attention to problems of management through new modern methods of statistics, mathematics, and operations research. The manager is now in a position to employ many of the tools of the mathematician. Linear-programming techniques have been in use for some time. Statistical techniques, such as time-series analysis, multiple correlation, and analysis of variances have been programmed for computer application.

Operations research was born as a science in World War II out of the urgencies and the complexities of problem-solving and in recognition of the necessity to bring to bear on the problem the techniques of all branches of basic and applied sciences. In financial management, the operations-research approach is truly promising and practical when, with the computer, the way is opened for work with mathematical models and business simulation. As Gerald Phillippe[6] points out: Computers and such techniques provide the ability to test plans and make inexpensive business mistakes experimentally rather than catastrophically in the market place—and make it possible to adjust rapidly to new business situations.

Internal auditing also was adopted in the past decade as a management-control tool on a broader scale than heretofore. With a true use of internal audit, the auditor is invited to look beyond the verification of accounts and financial reporting and to offer an independent appraisal and evaluation of management's policies and procedures in actual operation. The establishment of an internal audit function is an effort to bridge the gap between management and action.

Financial practices seem to have made considerable progress in another area, that of scientific sampling. For many years, a body of knowledge has been built up on the sampling theory and practiced on a scientific basis. While there had been wide acceptance in many fields, accounting and auditing had been quite aloof. During the war, particularly in measuring procurement-contract performance, techniques of scientific sampling were utilized, and in the past decade acceptance of scientific sampling in accounting and auditing in general has made considerable headway.

The economic pressures of high labor costs and the expanding paperwork requirements have produced proportional increases in interest in two other fields; namely, work measurement and work simplification in clerical operations. While intensity of interest in no way should be misconstrued as progress, the measure of progress in these two different areas is difficult, and outstanding landmarks or technological break-throughs are not very evident. In general, however, some of the improvement in these techniques in the plant itself have seeped through for adoption in the office. Predetermined time standards for clerical operations have been recognized as has the value of unit reporting, both reflecting wider employment in managing the office.

[6] G. L. Phillippe, Comptroller, General Electric Company in AMA Management Report No. 46, Data Processing Today, a Progress Report, 1960.

Conclusion

In conclusion, to those associated with the financial practices of general management, the technological improvements of the past decade have been nothing less than romantic ecstasy; and the practices developed to cope with the contemporary economic environment have been as stimulating and interesting as could ever be desired. It is hoped those individuals associated with the new practices and new tools will have made their way successfully and rewardingly as to membership on the management team.

DISCUSSION

Raymond Villers[7]

General impression is that this is a very interesting review of the Practices in General Management—Financial. It is right to stress the importance of the problems raised by taxes and by foreign competition. In fact, I think that the dilemma created by foreign competition will become more and more of a problem. We do not want to close the door to imports from friendly nations throughout the world, and at the same time we find it sometimes impossible to compete with manufacturers who are paying wages that do not compare to the wages we are paying, while also at the same time we certainly do not want to reduce the standard of living in our nation.

Mention is made that accelerated depreciation is not "tax forgiveness, but merely deferral." This is a very interesting point that deserves full attention, because in the years to come, that is, six years after the Revenue Act of 1954, some businesses will find that they are now using fully depreciated equipment and will have to pay higher taxes which actually amount to reimbursing the loan they have received from Uncle Sam. This may create a cash problem.

There are two points which I think should be added to get a clear picture of the recent developments during the last decade:

One: Complete recognition of the break-even analysis problem. Work on break-even analysis was started in 1914 by my late associate, Walter Rautenstrauch. After *Fortune* magazine, in February, 1949, called attention to his pioneering work, increasing recognition has been given during the last decade to the use of the break-even chart, the sales mixture chart, and the profit and loss chart, as efficient tools of profit control.[8]

Two: In recent years, it has become increasingly recognized that accounting provides a record of the money that has been spent, that cost accounting provides a standard of measurement, that budgeting makes it possible to anticipate with a reasonable degree of accuracy the money that will be spent, but that there is also a need for measuring what has been accomplished for the money that was spent, or what will be accomplished for the money that will be spent. For this reason, increasing attention is given to the need for the measurement of executive performance. This has stimulated the new development in the planning and control function. Electronic computers are closely related to these new developments.[9]

[7] Rautenstrauch & Villers, New York, N. Y. Mem. ASME.

[8] R. Villers, "Walter Rautenstrauch's Pioneering Work—a 50th Anniversary," *Journal of Industrial Engineering*, January, 1958.

R. Villers, "Dynamic Management in Industry" Prentice-Hall, 1960, p. 431 ff.

[9] W. B. Harrison, *Proceedings AIEE*, Symposium on Trends and Advances in Organization Planning, The Role of Measurement in Organization Planning and Replanning, 1958.

R. Villers, "Recent Trends in Industrial Engineering," Proceedings of the 1959 National Convention of the AIIE.

R. Villers, "Recent Trends in the Planning and Control Function," Controller Institute, Eastern Area Conference, May, 1960.

R. Villers, "Dynamic Management in Industry," Prentice-Hall, 1960, p. 368 ff.

Author's Closure

The discusser, Ray Villers, brought out that the accelerated depreciation methods under the 1954 Act have now had time to depreciate short-lived property. When you also include the rapid amortization of defense projects during the Korean War there are now many companies operating with fully depreciated capital items. It should be noted there is nothing inherently wrong in operating with fully depreciated assets as long as the effect on cash flow is recognized and anticipated—in fact it is probably best to get your money back as soon as you can. The optimum situation in this respect is to be able to follow accelerated amortization on a level annual capital replacement program.

Secondly, I would say that with my company there is no danger, as Ray Villers intimated, of over-simplification of profit equalling sales minus costs. With Southern Railway there can be no over-simplification in showing a net profit consistent with public service requirements. The over-all good of employees is best served by efficiency and economy. It is not served by operating trains merely to provide employment; nor is public service enhanced by operating trains that people do not ride. The survival of the free enterprise system and the avoidance of a nationalized rail system requires observance of the principle of serving the public interest but at a reasonable rate of return on investment.

A. W. RATHE
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Practices in General Management—Measurements and Control[1]

Material Measures

MANY yardsticks in common use in management today are a residue from the thinking of older times. They record, too often, the impact which just one component makes upon the total picture. They reflect the days when

- . . executive concern was generally limited to one specific function,
- . . tools were born more often as slaves to narrow objectives rather than as keys to the full vista of managerial responsibilities,
- . . management was not yet seen as an activity in its own right.

Within their native limitation, these measuring techniques have continued yeoman service during the decade under review. But some of them are beginning to sprout also significant developments whose objectives include the deliberate widening of the areas each records.

Accounting remains the guardian of financial information. It still is management's measurement tool with the longest record of splendid and effective service. In providing information on financial and cost performance, it stands guard at one of the most sensitive spots in any organization.

During the 1950's, as at any other time, management recognized the contribution of "accounting" through its historically and legally incontestable account of the receipt and use of monies. This recognition took, in many instances, the form of extending its mandate to include the provision of more operationally meaningful data.

The reconciliation of these two objectives is obstructed by powerful problems: The first task imposes the obligation to keep records comparable over the years; this emphasizes the past while the second mission stresses the future. In addition, the former requires compliance with many laws; the latter is concerned with the specific realities confronting the specific circumstances of each organization which cannot, as a rule, be built into laws whose view must be general. However, significant strides have been made in the past few years, particularly in terms of inserting accounting into the chain of managerial information on many aspects of performance.

Another old-timer is "work measurement." Its goal is the record of the time aspects of output. Important developments have continued during the past ten years, especially through

- . . utilization of statistical concepts which brought, for instance, the wider adoption of "work sampling,"
- . . increasing use of predetermined time units by means of such systems as "methods-time-measurement," "work factor," and others.

The dual duty of recording quantity and quality considerations of performance continues to be fulfilled by "production control" and "inspection" techniques. One of the more outstanding achievements in both fields is their persistent penetration of areas beyond the confines of production operations. They have established a beachhead on many fronts, such as clerical and administrative work, marketing, design, and still other functions.

Executives of this generation are recognizing ever more widely that there is no stronger foundation for a decision than a wealth of factual data. A promising development in recent years has been the increasing insistence upon management review data beyond those generated by the four techniques just sketched. A sizable amount of attention has been devoted to the construction of yardsticks which begin to make "intangibles" measurable. General Electric's "key result areas" are one of the most noteworthy contributions toward that end as . . .

- . . they spotlight seven prime accomplishments for any commercial enterprise; namely,
  - —profitability,
  - —market position,
  - —productivity,
  - —product leadership,
  - —personnel development,
  - —employee attitudes,
  - —public responsibility;
- . . the company proceeded to develop practically useful yardsticks for each of these seven segments and their major components.

Another has been the design of a number of "Service Indexes" by the Bell System for some of its "unmeasurable" operations, such as. .

- . . dial service,
- . . manual service,
- . . toll service,
- . . information service,
- . . collection service,
- . . directory service,
- . . repair service.

For each of these activities, inspection yields factual measures of the effectiveness of the work in terms of comparison against predetermined targets.

However even these, and indeed other, high lights cannot obscure the fact that the lack of measurability is still a more common characteristic in 1960 than the state of either art or science should permit. Management could put the yardstick on just about any aspect it desires to measure as long as it is satisfied with practically useful readings. Truly scientific results are still a matter for future contributions in many areas.

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[1] Part of the report, "Ten Years' Progress in Management, 1950–1960." This paper utilizes a minor portion of the research undertaken on behalf of the Symposium on Management Control Systems which was held by System Development Corporation in Santa Monica, Calif., in July, 1959; it includes, to a small extent, some phraseology employed in reporting it there under the title, "Growth of Management Control in Business."

Contributed by the Management Division and presented at the Winter Annual Meeting, New York. N. Y., November 27–December 2, 1960, of THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Manuscript received at ASME Headquarters, July 26, 1960. Paper No. 60—WA-69.

Measuring People

The 1950's have brought decided progress in this challenging task. Perhaps most profitable is the growing recognition of a fundamental which was commented upon in the "First Ten Year Report" and in other sources, fifty or more years ago: We cannot place people under the same sort of inspection microscope which examines products for "go—no go" or "acceptable—reject." People are individuals—with individual and purposeful goals and actions. Each has a value by himself which can neither be totaled arithmetically nor averaged.

This value varies as each individual adjusts his contribution with his reaction to the circumstances as he sees them. In the 1950's, management has learned that it is less the "value" of a person which it is important for his organization to know; rather it is his contribution to his unit which it is management's obligation to measure.

This conclusion has started what is today still but a beginning trend. However, it seems reasonably justified to speculate that developments so far promise the writer on this topic ten years hence the likelihood of being able to report substantial progress. The situation reflects the growing awareness of management's conceivably biggest problems; namely, the reconciliation of the legitimate desires of the individual with the needs of the organization of which he has become a voluntary member.

Some measures of specific contributions to the objectives of a group have become available through research in the social sciences. Their practicality as well as their number are bound to increase remarkably if current indications of success in the laboratories continue to be borne out in their application in the crucibles of business operations.

Management's Information Needs

The decade just passed has also given rise to vastly increased requirements for information. Even now, the public image of the successful executive is likely to be still along the lines of a "Daddy Warbucks"—with five phone sets on his desk, which are in constant use because the boss barks orders into one, crushes the competition through another, buys square miles of waste land in the Antarctic via the third, dispatches a nuclear-powered air fleet to that region on a fourth trunk, and so on—all off the cuff, at the spur of the moment. The crux of this perhaps slightly exaggerated scene is the instinctive omission of the need for the establishment of facts.

Too little had been known about management in the past to permit facts to play a key role in many crucial decisions. The need for operating in this fashion produced some of the most successful (and ruthless) "captains of industry." They built the greatest economic empire the world has ever seen—with iron fists, with fabulous results, on hunch and guess.

But things are changing. Disregard of facts, which was once the characteristic of executive strength, has now become the hallmark of managerial weakness. The thirst for information, which management has exhibited in the past few years to ever-increasing degree, is bound to grow ravishingly. Before the first of these Ten Year Reports was written, one of management's all-time greats, Henry L. Gantt, alerted business leaders: "If we allow ourselves to be governed by opinion where it is possible to obtain facts, we shall lose in our competition with those who base their actions on fact." [2]

Fortunately, today's technology provides much wider opportunities for the generation of facts. Therefore one other development which is typical of progress during the 1950's is the emphasis on "integrated data-processing." This term, widely identified with the equipment that may be involved, is meant to express rather the fundamental need for an integral network of managerial intelligence which covers all significant matter. The presence of punch cards, computers, five-channel tapes, or whatever other electromechanical-chemical equipment might be employed, is secondary although often desirable and perhaps mandatory; the heart of the process is, however, availability of factual information on all strategic points of performance needed to convey a complete record in which all parts dovetail.

At the threshold to the "Soaring Sixties," management's concern with measurement comes down, primarily, to the deliberate cultivation of the habit to demand more facts and figures rather than to subject decisions to the jeopardy of opinions and guesses.

Review

Measuring techniques contain opportunities for

- . . observation of operations wherever and whatever they may be,
- . . recording of results,
- . . collection and checking of performance data.

Their end result are facts; at best, they would be useful and reliable, quantitative and accurate. But even facts, in themselves, mean nothing by themselves.

They take on significance only when viewed against the situation which created them. Measures gage effects; we need the causes of these effects before the recording apparatus could begin to pay off in business practice.

Thus it becomes understandable that another concept grew in acceptance during the 1950's, the mission of one of the key elements of the total managerial task, that of "review." It includes now the measurement of performance as well as the appraisal of these findings. The facts in the record are analyzed and evaluated so that conclusions can be distilled from the results of operations of the past which can become useful for the plans and operations of the future.

Management observed in the years just passed that perhaps the foremost characteristic of effective review is its intimate interplay with planning. Deceivingly simple as a statement yet surprisingly complex in actual practice, observation of this interplay has spotlighted the fundamental difference inherent in the nature of review and planning: At best, review can point out failures after they have happened while planning can prevent (some of) them in the first place.

This principle is at the root of another significant trend of the 1950's; namely, the shift of some emphasis from review to planning. It accelerated because of a separate impetus that planning received as a result of World War II experiences. Particularly long-range planning is close to the top of the subjects deserving greater executive attention—right now and undoubtedly for a number of years to come.

The close interaction of planning and review is also evidenced by the fact that some planning tools are simultaneously review instruments. The budget and standard cost and their variations are typical examples.

Another important recognition is the need for better feedback to planning of the conclusions unearthed in review. This trait bestows a systems character upon management, upon which later passages will make additional comments.

Management Research

It is the mission of managerial feedback to make future planning sensitive to the results of the past. Thus the organization can reinforce its dynamic nature and become more responsive to changes in conditions and ideas. However, feed*back* is capable of plowing back into the future only those experiences which the

[2] H. L. Gantt, "Industrial Leadership," Yale University Press, New Haven, Conn., 1916, p. 89.

organization generates itself. For feed-*in* of information, of knowledge and facts from the outside, the 1950's turned to "management research and development." This activity is likely to appear, with the more detached objectivity of hindsight in later years, as one of this period's most powerful contributions.

The lifeblood of research is science. And it was during the past decade that the scientist entered the business scene, on behalf of managerial problems, *en masse* rather than as an isolated instance. Even in 1960, some business organizations may still challenge this statement; but their voice is destined to fade fast.

The realization is growing that it is the basic job of research to build the foundation for the development of things which we shall need tomorrow when what we have today won't do anymore—in the field of medicine, in technological matters, and indeed in management. Long before this ASME series began in 1912, modern concepts of management had been presented under the label "scientific management." It was given to the 1950's to score another real advance for this feature. The vanguard comprised statisticians and mathematicians, quickly followed by experts in computers.

To their everlasting credit, they cut loose techniques which had long been slumbering in ivy-covered and dust-laden books; they developed them, as well as new tools, into practically useful vehicles which could explore new avenues to the solution of many old and some fresh management problems. Warehouse and office, plant and laboratory, showroom and toolshed are reverberating with battle cries; such as

- . . dispersion measures
- . . probability theory
- . . linear, quadratic, and other programming
- . . game and information theory
- . . factor analysis and statistical decision theory
- . . Monte Carlo methods
- . . sampling and value, replacement, and maintenance theory
- . . search, communication, and servo theory
- . . cybernetics
- . . and still others.

Numerous results accomplished through painstaking scientific attack, proved prior empiric approaches correct; others showed the errors of past ways. And some produced scenes sadly reminiscent of some of the less pleasurable memories of the efficiency expert of olden times and ill repute. At this vantage point in time, we can express the hope for an early disappearance of the latter and the certainty that many additional disciplines will join the forward march of science in management.

Management and Its Relation to Science and Engineering

Management is as old as mankind. Its most persistent and successful helpmate has been engineering. Now science offers its potential. With its presence, the other two partners are reexamining the respective roles of this trio.

The 1950's hesitated to pass judgment on this question. But they produced trends whose intricacies the future has yet to dissect in full. In the meantime, we can mark up for certain such developments as

- . . the irrevocable commitment to the proposition that *Management* is an activity in its own right, entrusted with responsibilities which must lead it to the evolution into a profession;
- . . *Engineering*'s contributions, so far too heavily concentrated in production and plant, are successfully applied to a growing number of other areas; the branch of the engineering profession primarily concerned with representing it on the management scene, Industrial Engineering, has enjoyed the largest growth in relative numbers of its practitioners and, at the end of the decade, had passed one of the founder society specialties in terms of freshman enrollments;
- . . *Science* is exercising its power (although in some instances just seeing its venerable name arrogated) as "Operations Research," "Management Science" and with still different appellations; in as yet a minority of cases do these contributions represent true scientific discoveries; in many others, they mark weighty additions either to the results expected from Planning or to the tasks associated with Review.

And science has, in partnership with other sources, contributed to a still evolving answer to another question mark which the 1950's pass on to younger years for fuller treatment; namely, the matter of control in management.

What Is "Control"?

Control is of course a key objective of management—possibly *the* single most important target. As management reflects society of which it is an integral part, its means of controlling things and people mirror the ways by which civilization has dealt with this problem.

Control has been the problem of the world since its population grew from one to two. As fifty thousand years are said to have passed since this memorable event, it is impossible for any decade, including that of the "Fabulous Fifties," to make sizable changes in a concept of such remarkable persistence. But questions about control in management—its true seat of power, its scope, its philosophy—were raised in the past ten years with magnificent generosity.

Answers were much scantier. One of the reasons for this is the hurdle of semantics that attaches itself to so many commonplace phenomena which everyone "knows of course inside-out." But just what is "control"?

The term has many and different meanings. There are

- . . production and quality control
- . . labor and safety control
- . . budgetary and inventory control
- . . arms and rent control
- . . birth and traffic control
- . . pest and parking control
- . . politicians who control votes (some people claim)
- . . valves which control temperature
- . . the airport tower controlling plane traffic.

In each of these, "control" has its own specific meaning. In some of them, and many others, there is the connotation of force, even of domination; they conjure up the picture of penalties. This so thoroughly negative approach is at the bottom of many failures of control—in management and indeed the world at large.

In management, people are the most imminent link to any tangible result, be it profits or markets, material or equipment, or products. Why must control continue to suffer from the heritage of ancient cruelty to individuals by implying the need for tyranny, for retribution, as a matter of everyday occurrence?

It is toward the gradual and perhaps revolutionary change of this stigma of control that the 1950's have made remarkable contributions. They can be related in many ways; one is the concept of the "control" or, better termed, the "management cycle."

The Management Cycle

Managing is a cyclical process. As its most basic essentials, the management cycle contains the three[3] elements of:

1 Planning. Goals are established for the organization as a whole as well as for every one of its components. Available resources are examined to determine whether they permit the realization of these targets. This establishes the best way by which the objectives can be reached under the prevailing conditions.

2 Operations. A choice among possible alternative plans is made. Necessary decisions are discussed with all concerned. Activities proceed, under the direction of management, as closely in harmony with the plans as possible.

3 Review. Actual results are recorded and interpreted so as to distill those conclusions out of the effects of operating which are useful for future plans.

It is feedback that closes the cycle within which these elements operate, without, however, constructing a "closed loop" in the strict technical sense of the term; adjustments of input to output are, happily or unfortunately, not made automatically in management.

Within this concept of the management cycle, *review* is more passive than *control*.

For control to be effective, the executive needs more than just this one (review) element; he has to put into play all three of the key sectors which constitute the manager's realm at every level and on any problem. Review is perhaps best characterized by its service trait in that it, as well as planning, exists solely for the purpose of making better operations possible in the future. Control in the sense of "holding the reins," must remain the prerogative of operations because it is there—and only there—that activities are directed.

During the early 1950's, there was a trend to call the sum total of planning and review "management control." More recent practice seems to abandon this terminology in favor of designating these two elements more appropriately as "management service." What a delightful calling card this period would leave to posterity if we would be able to conclude some years from now that the change from *control* to *service* was something more than semantics.

Some Examples of Modern Management Control

Three major categories of developments appear to comprise the show case of effective management-control innovations during the 1950's. The first is inherent in such thinking as just discussed in terms of the management cycle. It is also reflected in the highly significant statement on the Controllership function which the Committee on Ethics and Eligibility of the Controllers Institute of America drafted in the late 1940's, and which became operative in the 1950's.

In the second group, the control system depends upon data-processing equipment, a computer, and its programming. Representative also of other applications is the pioneering contribution made by PERT (Program Evaluation and Review Technique). This is a technique for the measuring and controlling of development progress for the Polaris Fleet Ballistic Missile Program of the U. S. Navy. The authors[4] report that the system is also in "operation in a number of industrial concerns and governmental agencies."

Other examples may be cited from the field of military command control systems as they are for instance in use by the Strategic Air Command (SAGE and SACCS). In June, 1960, news on a civilian counterpart was released; this "management operating system" will make possible a seemingly even farther-reaching direction of factory operations since the manufacturer, International Business Machines Corporation, states that it will include

- . . forecasting
- . . materials planning
- . . inventories
- . . production scheduling
- . . dispatching
- . . as well as the evaluation needed to check on the whole process.

This example leads logically into the third and last major area of management-control systems characteristic of the 1950's, the automation of production activities in a number of industries. It is perhaps a bit chauvinistic for the past decade to claim the prerogative of having seen the birth of automation; in some electric utilities, this period brought the fortieth anniversary of their pioneering installation. However, the 1950's witnessed the emergence of automation as a key resource of our society—with all its problems and challenges whose solution demands the combined efforts of the manager-engineer-scientist trio in close co-operation with other groups.

The Past Is Prelude

Space limitations prevent further discussion of contributions by the 1950's which deserve mention. Two phenomena must, however, be touched upon as their existence aggravates the problems which the past hands to the future for solution.

As any period of heavy innovation, the 1950's faced the potential pitfall of confusing truly new ideas with shiningly new gadgets. The future will demand, particularly in the fields of measurements and control, a better balance in distinguishing between gimmicks as such and the purpose they should serve. The term "gismo" itself had its origin in this period; under its umbrella, we can find much electronic hardware, many statistical and mathematical techniques, and lots of other accessories which took the liberty, in some cases, to occupy the center of the stage while the thoughts which they should serve were relegated to the background.

The second point is also not a monopoly of the 1950's but still one of its landmarks. It concerns the vast difference in the existence or discovery of new or newly reappearing ideas on the one hand and their application on the other. The time lag between these two was, in too many instances, as imposing as the magnitude of the innovation as such. While this is natural, it also represents a special heritage for the future.

The most encouraging conclusion from looking back onto the 1950's might thus be this thought: They left to the Sixties a plethora of unsolved problems; but they deposited them into a climate which should bring progress that may dwarf many achievements of the past decade.

Bibliography

A practically meaningful bibliography covering this subject would be likely to occupy space of the magnitude of the paper itself. Too many areas are involved which makes a condensation difficult. In addition, it would have to contain many papers, research reports, and books which merit inclusion for at least a portion of their content but which were published prior to the

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[3] The number of elements into which management's basic tasks may be divided varies in the literature widely. For instance, General Electric views the total managerial area as comprising: (1) Planning, (2) organizing, (3) integrating, (4) measuring.

In the view of many, including this reviewer, the difference in the number of subdivisions is mainly semantic.

[4] D. G. Malcolm, J. H. Roseboom, and C. E. Clark, "Application of a Technique for Research and Development Program Evaluation," *Operations Research*, vol. 7, 1959.

time which this *Ten Year Report* covers. Consequently, we append merely a short excerpt; it includes (as the first and last item) two pertinent bibliographies as well as eight books which, in the view of the author, could make some particularly useful contributions through their discussions or references.

1 Controllership Foundation, Inc., "Management Planning and Control," an annotated bibliography, New York, N. Y., 1955.

2 R. N. Anthony, "Management Controls in Industrial Research Organizations," Division of Research, Graduate School of Business Administration, Harvard University, Cambridge, Mass., 1952.

3 Stafford Beer, "Cybernetics and Management," John Wiley & Sons, Inc., New York, N. Y., 1959.

4 E. H. Bowman and R. B. Fetter, "Analysis for Production Management," Richard D. Irwin, Inc., Homewood, Ill., 1957.

5 Herman Chernoff and L. E. Moses, "Elementary Decision Theory," John Wiley & Sons, Inc., New York, N. Y., 1959.

6 David Ewing, editor, "Long Range Planning for Management," Harper and Brothers, New York, N. Y., 1958.

7 R. A. Foulke, "Practical Financial Statement Analysis," McGraw-Hill Book Company, Inc., New York, N. Y., 1958.

8 J. H. Jackson, "The Comptroller, His Functions and Organization," Harvard University Press, Cambridge, Mass., 1948.

9 J. B. Quinn, "Yardsticks for Industrial Research," Ronald Press Company, New York, N. Y., 1959.

10 Paul Wasserman, "Measurement and Evaluation of Organizational Performance," an annotated bibliography, Graduate School of Business and Public Administration, Cornell University, Ithaca, N. Y., 1959.

DISCUSSION

Virgil K. Rowland[5]

Dr. Rathe has written a very useful paper. He has given us a panoramic view of management progress, capturing the years and telescoping them so that we might more adequately evaluate the achievements made in scientific measurement and control. My discussion of his paper is not in contradiction or contravention, but rather an underlining of his fundamental and worthwhile statements.

Dr. Rathe discussed the necessity of science in management. Science is knowledge. Its purpose is understanding. But it is more than this: The end of science is to predict from observable facts the results that will come from an action. This is the essence of control: "The function whereby every manager, from the president to the foreman, makes sure that what is done will be that which is intended."[6] The management person must be a predictor of events, for he is constantly faced with the responsibility for making decisions. This, therefore, is why it is imperative that we develop appropriate measurements and controls. However, it is important that we remember, as Will Rogers said, that "Numbers don't mean nuthin'; it's people that count."[7]

In many ways science and technology have outstripped our understanding of what we have created. We find ourselves, as did Dr. Frankenstein, a creator, unable to comprehend fully all of the forces we have released and the effect such advances have on man and society. The reason for this, according to Dr. Alexis Carrell, is that "Modern society . . . believes in the reality of universals and treats men as abstractions. The confusion of the concepts of individual and of human beings has led industrial civilization to a fundamental error, the standardization of men."[8]

While it is true that we have made great strides in our understanding of scientific management, the science of man remains relatively unexplored. It is an elusive discipline, but it must be considered if true integration of all of the processes which exist in an enterprise is to be achieved. This is not a new concept; even so, it is recognized that "while the point has been made again and again, planning continues to focus on the engineering design and to ignore the psychological and sociological factors in man-machine-organization systems."[9] To assure further progress in scientific management, greater attention should be given to the blending of the social and psychological factors with the technical and scientific.

If you, who are so concerned and aware of the need for knowing and understanding the variables involved in all processes, could bend your tremendous energy, your natural inquisitiveness to the study of man; if you could participate in making the sixties that period which would be remembered as having produced the "breakthrough," what a wonderful and exciting adventure, a triumph, this would be. Then, rather than being reactors to events, we would more fully be shapers of events.

Management is an art as well as a science. We, therefore, need men who can effectively apply their knowledge—not the Daddy Warbucks type, but men of principle, vision, integrity, and purpose. We need managers who practice the art of management.

Can we follow the advice given us back in 1813 by Robert Owen, "If due care as to the state of your inanimate machines can produce beneficial results, what may not be expected if you devote equal attention to your vital machines, which are far more wonderfully constructed?" Is this a worth-while challenge? I give it to you—it is yours to pursue.

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[5] The Detroit Edison Company, Detroit, Mich.

[6] From "Principles of Management," by Harold Koontz and Cyril O'Donnell, published by McGraw-Hill Book Company, Inc., New York, N. Y., 1955.

[7] From "Reading Course in Executive Technique," Section 1, Book 3, by Alex W. Rathe, published by Funk & Wagnalls Company, New York, N. Y., 1948.

[8] From "Man, the Unknown," published by Harper & Brothers, New York, N. Y., 1935.

[9] From "Automation and the Worker," by Floyd C. Mann and L. Richard Hoffman, published by Henry Holt and Company, Inc., New York, N. Y., 1960.

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Practices in Operational Management—The Management of Industrial Research[1]

Preface

THE management of industrial research has been the subject of innumerable symposia, panel discussions, and publications in the past ten years, primarily because it is only within this period that management has recognized industrial research as an integral part of business. Moreover, it is during this period that, for the most part, industrial research has grown to such proportion as to warrant the major attention of management.

The problem of managing industrial research comprises the same basic factors that make up any management problem. Some of these are: The statement of objectives, the selection of people, programming, budgeting, and the measurement of the results. The unique aspects of research management, as distinct from general management, appear when we get into detailed consideration of these factors. For example:

The objective in all cases is to help the corporation make money, but in research it is not just this year or just in the next few years, or the next decade—it is all of this plus an even longer time scale. We want the best people in all cases, but we need a wide variety of people in industrial research; the blue sky dreamer, the precision minded scientist, the scientist-engineer, the scientist-salesman, and the scientist-administrator. Each requires a different management approach and no one of these is the best man. For a research organization we need them all—a balanced group of the lot.

Programming cannot be really definitive. Any research laboratory in which the program is inflexible, and the broader details are not changed as the various projects develop is automatically doomed to failure.

Budgeting is in the same position. Total budgets, divided into large segments, can be predetermined but detailed budgets must be as flexible as the detailed program.

And finally, the measurement of results may be simple some years after the research is finished, but is intrinsically impossible on an arithmetical basis at the time that the research is being done.

As may be judged by the foregoing examples, the problem of research management has a unique flavor requiring great flexibility in organization and approach and requires leaders with a broad scope and specific research experience. Research promotes change and probably the only rule for management of industrial research on which all can agree is that the approach of management must change with the changing times and the changing position of industrial research. Dr. Work has well summarized many of the approaches. He, too, shows that flexibility is of the essence and that no text on research management can be definitive except for a given point of time. But even this is healthy in that the greatest boon to the organization and management of research is the continued application of the research method itself to research management.

Augustus B. Kinzel[3]

Introduction

The present interest in developing management techniques for industrial research is a direct result of the growth of this activity into a tremendous industry in itself. According to the latest estimates from the National Science Foundation, $9,400,000,000 will be spent on research performed by industry in the year 1959-1960 [1].[4] On the basis of dollar volume, this is almost 60 times as much as was spent for the same purpose three decades ago, and better than five times as much as was spent in 1949-1950. These figures may give a slightly exaggerated view of the expansion in industrial research, because the estimates for 1930 and 1949-1950 were derived from questionnaire-type surveys, and cannot be expected to have the completeness or accuracy of the estimates made by the National Science Foundation on the basis of scientific sampling techniques [2, 3]. It is, moreover, necessary to take the effects of inflation into account when evaluating growth in terms of dollar volume. Still, when all due allowances are made, it is apparent that research was established as an integral and vital part of the industrial economy of this country at the beginning of the past decade, and that it has continued to expand throughout the past ten years. Even more significant than the financial aspects of industrial research is the fact that into this field of endeavor is being channeled a substantial portion of a critically important human resource—scientists and engineers. In the two years from 1957 to 1959 alone, the number of professionally educated people in industrial research jumped from 225,000 to 270,000.

Perhaps the best idea of the rate of growth in industrial research can be gained by comparing the NSF revised figures for 1953-1954 with the projected estimates for 1959-1960 [4]. Of a total of $5,150,000,000 spent in the United States for research and development in the 1953-1954 period, $3,630,000,000 (or 70 per cent) was for work performed by industry. At that time, approximately 30 per cent of the industrial research was supported by government funds. This year, industrial research will account for 75 per cent of the total of $12,430,000,000 to be spent for research and development, and more than half of the funds spent for this purpose will be supplied by the Government. To some extent, at least, the increase in governmental support is due to appropriation of funds for industrial participation in the activities of the International Geophysical Year. Direct funding for this purpose has amounted to 43.5 million dollars in the past three years, and additional indirect support has been provided in the form of Department of Defense co-operation in the rocket and satellite programs.

Defense-oriented research aside, however, industry itself has

[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

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[4] Numbers in brackets designate References at end of paper.

increased its research and development activities by 63 per cent in the four years from 1953-1954 to 1957-1958, and it is safe to estimate that it has more than doubled the amount of money spent for this purpose in the past ten years. There are two reasons for this: (*a*) It has been demonstrated that research pays big dividends. Most of the companies with the vision and daring to initiate research programs in the 1930's or earlier have grown by leaps and bounds. Their evident prosperity attracted attention, and others have emulated them in the hope of achieving the same results. It is becoming apparent, however, that unfortunately the appropriation of money for research is not in itself a sure-fire method of increasing profits and cornering a larger share of the market.

(*b*) This brings us to the second reason for the swift multiplication of industrial research. In today's rapidly expanding technology, present products and processes are suffering from a kind of galloping obsolescence. Many companies are compelled to do research merely to stay in business. As competing companies all engage in research, the competitive advantage—the possibility of great profits—decreases. At the same time, the penalties for not doing research become more severe.

All business involves a calculated risk, and the risk in research, because it deals with the presently unknown, is greater than in other areas. The art of management consists of increasing the amount of calculation and decreasing the amount of risk. In this comparatively young field, there are still a number of imponderables that must be accepted. However, some guide lines can be established.

Industrial Research Objectives

In view of the confusion and disagreement in late years over what is "basic" and what is "applied" research, it may be well for me to explain the sense in which I use the expression "industrial research." This is one context in which it is valid to distinguish between basic and applied research on the basis of motivation, and by extension to define industrial research as primarily applied research. The motive of the basic or "pure" scientist is to add to the sum of human knowledge concerning the physical universe; that of the applied scientist is to translate such knowledge into new products, processes, or services for the use of mankind.

Only in terms of primary motivation can this distinction be quite clear. Thus, it relates to the organization and personnel performing the research rather than to the nature of the research itself. The basic scientist has no objection to seeing his discoveries put to good use, and the applied scientist is certainly not unhappy if he can add to the sum total of human knowledge. The two can, in fact, independently pursue the same course of investigation, differing only in their reasons for undertaking the research. However, their different motives are sufficiently important to require different approaches to research management and direction.

If these definitions of basic and applied research are accepted for purposes of this discussion, we can further clarify the meaning of "industrial research," restricting it to applied research undertaken by an industrial organization for the purpose of holding or improving its position in a highly competitive market. Note that this does not preclude research of a fundamental nature, if industrial management has both the imagination to foresee its ultimate applications and the financial and human resources to carry the research to a successful conclusion and exploit its results.

Neither should this definition of industrial research be interpreted as implying that industry should not help support basic research of an even more advanced kind, where the eventual applications are indeterminate and a given industry cannot count on a specific competitive advantage. Indeed, many responsible businessmen are of the opinion that ways must be found to increase industrial support of such research. "Enlightened self-interest" has led most American industries—like other decent citizens—to recognize that they have patriotic, social, and educational obligations in addition to their unavoidable responsibility for protecting and advancing their individual financial interests. But this is another subject. A man may well be convinced that he is, in the long run, benefiting himself when he serves in the armed forces of his country, or endows a college, or donates to a charitable organization. He does not, however, attempt to assess the worth of these activities by the same criteria that he uses in judging the investment value of a share of stock or a piece of real estate.

We are concerned here, then, only with the research that industry undertakes for the same reason that it engages in other normal operations—that of assuring its own survival and growth. The objective is either to maintain or to increase the return per invested dollar. It is the function of research management to see that this objective is attained, because only so can the company discharge its dual responsibility to its investing stockholders and its employees.

Direction

The major considerations in research management are *judicious choice of the research to be undertaken, wise selection of research personnel, good utilization of the available scientific talent, adequate provision of research facilities, realistic programming, and integration of the research with the over-all company objectives.*

Several items on this list bring up a question that has been raised frequently in the past few years: Can or should research be directed and programmed? In the heated discussions prompted by national concern over our scientific progress relative to that of the USSR, a great deal of emphasis was placed on the need for free scientific inquiry. Certainly there is such a need. It should be recognized fully. But the inference that this is incompatible with direction and programming is not warranted. The real objection—the real danger to scientific freedom—lies not in management but in mismanagement; not in programming but in unrealistic programming. Even a brief perusal of the lives of major scientists of the past will dispel any illusion that these men worked without aim or sense of urgency. It is true that most of them directed and programmed themselves—although we might sometimes regret that they did not have the support of good management to relieve them of financial pressures and extraneous problems, so that we might have had even greater benefits from their efforts. It is also true that there will undoubtedly continue to be individual scientists who will perform these functions for themselves, particularly in the area of fundamental research.

But industrial research, at least since the outbreak of World War II, has been overwhelmingly a co-operative enterprise. It usually involves three important areas of teamwork: (*a*) Among the research scientists themselves, and between them and their supporting personnel; (*b*) between the research division and the other operating divisions of the company; and (*c*) between the research division and the over-all company management. It is obviously the prerogative of management to make final decisions on the nature, scope, and timing of the research undertaken, although a wise management will give thoughtful consideration to suggestions and advice from its research personnel. The scientist who joins the research staff of an industrial organization explicitly commits himself to work in an orderly fashion toward the legitimate commercial objectives of that organization. He is therefore prepared to accept management decisions concerning the commercial feasibility and potentialities of a possible new development.

Selection of Research

With respect to the selection of appropriate research projects, we are in much better position than Alexander the Great, who wept because there were no new worlds to conquer. Each scientific advance has opened up new areas of investigation, new opportunities. In choosing among these possibilities, a company will naturally be guided by its particular needs and aims. These may be for the solution of technical problems encountered in production, the improvement of existing products, the development of new products either to replace older, obsolescent ones or to enable the company to capture a larger share of the market, the improvement of processes, or the development of new processes, or any combination of these. Every company that survives in this competitive economy has some special capabilities, such as skilled personnel or special production facilities, which should help determine the direction of the research efforts.

To be profitable, the research must be of a kind that the company can afford to support to successful completion. The results must be available in an amount and quality that can be absorbed by the company operations, and the company must have the capital and other resources to permit proper exploitation of results.

Programming

In research for industrial purposes, timing is all-important. Some discoveries have been made too early; in fact, they have been "rediscovered" several times over a period of years before they could be put into application. Others have been made too late to yield full benefit to the organization sponsoring the research. Timing must be given serious consideration, both in the original selection of the research to be undertaken and in the programming of actual research performance.

It has been demonstrated that research can be programmed as realistically, though not as rigidly, as production. A research program calls for a substantial amount of flexibility. The number of unknowns at any given stage decides the requisite degree of flexibility in the schedule and the size of the contingency provision in the research budget. Thus, the latter development stages can be programmed almost as precisely as production—and almost three quarters of the industrial research performed today is of a developmental nature [5]. The nearer the work approaches to basic research, the wider must be the confidence intervals on the time and cost estimates.

The Research Budget

Thirty years ago, research was seldom budgeted. Perhaps the principal reason for this was that is was not taken very seriously. When research began to assume a truly important role in defense and industry, the necessity for some form of budgetary control became apparent. As early as 1940, the research budget had been adpoted by 70 per cent of the organizations conducting industrial research in this country [6]. The percentage remains substantially the same today, with the nonbudgeting group composed essentially of organizations too small to require formal techniques [7]. Perhaps the most significant development in this area in the past decade has been the sustained effort to modify standard budgetary techniques to adapt them to the research situations—which differs from most other industrial situations in that labor costs form an exceptionally large proportion (over 70 per cent) of the total costs [8]. Research budgeting is a subject so complex and so dependent upon the nature of the research performed that it would be useless to try to present a review of it here. There are, however, a number of publications on the subject. Some typical books and articles are listed among the references at the end of this paper [9–13].

How much should a company spend on research? This depends entirely on its situation; its size, the research activities of its competitors, the "state-of-the-art" in its field, its program for expansion, and the prospective return per dollar invested in research as compared to present and prospective returns from money invested in other activities. What management must determine is the amount of technology needed for the company to prosper. This obviously calls for thorough study of all available technical and market information but also requires management judgment based on experience and intuition—with perhaps just a little luck thrown in.

Organization

As industrial research has grown both in magnitude and recognized importance, the tendency has been to give the executive head of the research organization a top-management status comparable to that of the heads of other operating departments, such as Production and Sales—for instance, Vice-President for Research. Whatever his title, the research director acts as the liaison between research on the one hand and company management and other operating divisions on the other hand. In large and complex companies, the research is usually decentralized, although there may or may not be a central laboratory for long-range work. In co-ordinating the work of the decentralized laboratories, the director may have the help of an interlaboratory committee; in co-ordinating the total research effort with the activities of other portions of the company, he may himself be a member of a management committee.

The individual laboratories are usually broken down into divisions based on either the field of science or the processes or products under study. Where the research activity ranges from basic studies to development work, both breakdowns may be employed. Provision should be made for frequent and regular contact between the research staff and representatives of other divisions, to insure smooth transition of a new product from research through development into production.

Personnel

Beyond question, the single most important factor in getting good research and development work is selection of the research staff. The majority of important research discoveries have been made by a very small minority of the scientists engaged in research, and past performance is the best guarantee of future performance. However, men of established reputation are hard to get—and, in any event, it would be uneconomical and perhaps undesirable in other ways to attempt to staff entirely with men of this caliber. With all others, the trick is to select men of high research potential and then to provide them with the conditions and motivation that ensure high productivity. Some attempts have been made to develop techniques for measuring research potential. A few companies employ technical achievement tests and psychological tests for this purpose. However, the practice has not yet met with widespread acceptance. In general, aside from what can be learned through scrutiny of the prospective employee's academic record and industrial experience, personal evaluation by experienced men in the same field appears to be the most reliable basis for judgment.

Assuring Research Productivity

In view of the scarcity of good research personnel, considerable attention is paid to creating a favorable research environment. This involves everything from providing adequate motivation and fostering a co-operative attitude down to details of working conditions and living conditions.

Since men of good character do not accept employment and

remuneration from a company unless they intend to promote its interests in every legitimate way, the foundation for good motivation and hearty co-operation is firmly established. There will always be some minor conflicts along the way, but most of these can be resolved if management considers the personality attributes associated with those who do this kind of work. A man is unlikely to enter research unless he has some confidence in his own intelligence and judgment. He therefore expects a rather democratic organizational arrangement through which his opinions will be given a hearing and consideration by management. Unless a very poor job has been done in the selection of personnel, this kind of arrangement is also advantageous to management.

A basic tenet of scientific training is never to take anything for granted. Consequently, research people may be inclined to question management decisions on choice of projects to support, termination of unrewarding projects, and so on. They are, however, imbued with respect for facts and resigned to conceding the existence of factors outside their own fields of special competence. A little two-way communication between management and research can do much to obviate possible difficulties.

We have already mentioned the question of scientific freedom. In accepting employment, the research scientist has already both exercised his freedom of choice and accepted some restrictions on it. He has at least agreed to direct his efforts toward advancing the general objectives of the company. Few ever wish to evade this obligation, but there may be occasional differences of opinion about the course of action that will best advance the company's interests. In practice, this amounts to some conflict between formal, authorized projects and other experimentation which the research man believes even more important. I have heard this latter kind of research referred to as "bootleg" research, but most enlightened managements deliberately provide some time for this sort of activity. It helps foster scientific initiative—and occasionally does pay off better than the authorized research.

One of the advantages of this attitude is that it increases the chance for the happy accident—"serendipity" is the glamorous name by which it is called. Just as every oysterman hopes to find a pearl (though oysters provide his means of livelihood), every research scientist or engineer hopes for the unexpected phenomenon that will throw light on a basic physical law. We know how many important developments have come out of such lucky chances. But in a very real sense, luck is not the only element involved. The presence of an observer with the alertness to note the event and the intellectual capacity to interpret its significance is no accident.

Since men with such qualifications are in short supply, perhaps we should examine some of the available means of extending their effectiveness. This can be done, obviously, by assuring that they can spend maximum time and thought on their professional duties. This means the provision of adequate subprofessional help—technicians and clerical staff—and such other time-conservers as machines and mechanical aids, computers, and so on. There are also gains to be made through proper attention to equipping and housing the research staff. Several books and articles have been written recently on the design of laboratories, and there are some architectural firms that specialize in this field [14, 15].

Evaluation of Results

In all our efforts to develop techniques for research management, we come up against the slippery problem of evaluating research results. Measurement is, we know, essential to science; therefore, a number of evaluation methods have been proposed. Some of these are in the form of indexes. One of the most nearly objective is that of comparing return per invested research dollar with the return that could have been anticipated if the research had not been performed. The snag is in the word "anticipated." How can one measure exactly the losses that might have occurred if a certain course of action had not been taken? A company that patents a new material or product can scarcely judge whether a competitor might have done the same thing if the initiative had not been snatched away from him. Also, how are we to estimate quantitatively the influence of increased or decreased prestige (resulting from successful research or failure to do research, respectively) on other operations of the company? And over what period of time should the return be computed? A development that appears of only minor importance when it first appears may later provide the foundation for a much more profitable result. We must conclude that, if measurement lies at the heart of science, research management is today still as much art as science.

References

1 "Reviews of Data on Research and Development," National Science Foundation, Washington, D. C., NSF 59-65, No. 16, December, 1959, NSF 59-46, No. 14, August, 1959.

2 Ibid.

3 "Science and Engineering in American Industry," National Science Foundation, Washington, D. C., NSF 56-16, October, 1956, NSF 59-50, November, 1959.

4 Ibid.

5 "Reviews of Data on Research and Development," op. cit.

6 C. C. Furnas, editor, "Research in Industry: Its Organization and Management," D. Van Nostrand Company, Inc., New York, N. Y., 1948.

7 Carl Heyel, editor, "Handbook of Industrial Research Management," Reinhold Publishing Corporation, New York, N. Y., 1959, pp. 4–5.

8 "Costs, Budgeting, and Economics of Industrial Research," *Proceedings of the First Annual Conference on Industrial Research*, King's Crown Press, Columbia University, New York, N. Y., 1951, p. 153.

9 R. N. Anthony, "Management Controls in Industrial Research Organizations," Harvard University Graduate School of Business Administration, Boston, Mass., 1952, pp. 138–164.

10 C. F. Carter and B. F. Williams, "Industry and Technical Progress," Oxford University Press, New York and London, 1957.

11 D. B. Hertz, "The Theory and Practice of Industrial Research," McGraw-Hill Book Company, Inc., New York, N. Y., 1950.

12 J. B. Quinn, "Yardsticks for Industrial Research," Ronald Press, New York, N. Y., 1959.

13 G. W. Howard, "Common Sense in Research and Development Management," Vantage Press, New York, N. Y., 1955.

14 H. S. Coleman, editor, "Laboratory Design," National Research Council Report on Design, Construction, and Equipment of Laboratories, Reinhold Publishing Corporation, New York, N. Y., 1951.

15 F. W. Dodge, "Buildings for Research," *Architectural Record*, series of articles, New York, N. Y., 1958.

DISCUSSION

R. H. Lueck[5]

In his characteristically excellent presentation Dr. Work has touched on a number of subjects which have intrigued my interest. In the brief time at my disposal I can comment briefly on only three of them, namely,

1 The definition of industrial research
2 Programming industrial research
3 Evaluation of industrial research

Dr. Work has supplied definitions of basic and applied research with which I am in full accord, but then goes on to clarify the meaning of "Industrial Research" by "restricting it to applied

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research undertaken by an industrial organization for the purpose of holding or improving its position in a highly competitive market." To me "Industrial Research" is any research, basic or applied, which is sponsored by industry and performed in the facilities of industry. I must agree with Dr. Work that the primary function of an industrial laboratory is to produce the technology which the company requires in order to grow and maintain its competitive position, and the company which possesses the largest and most modern fund of technology and adds to it most frequently is the one that enjoys the best growth potential. For the most part, the production of technology involves applied research and development, but since these are nothing more than the application of established physical phenomena to the production of goods and services, there is no reason why fundamental research, carried on in the general field of a company's interests, cannot be classified as industrial research as well.

With respect to programming, I think it can be said without too much fear of contradiction that any industrial laboratory in which a substantial portion of the research is unprogrammed or, at least, not oriented, is a poorly managed laboratory. If the function of the laboratory is to produce the technology which the company requires, it is obvious that the research must be directed to some predetermined goals. For example, the investment of money in the full development of a bit of technology ten years prior to the time that it can be profitably exploited does not represent good financial management. It is akin to the investment of money in a manufacturing facility years before its capacity can be utilized. The interest on the investment is wasted and the money could be better utilized for more current projects. Likewise, the investment of money in a bit of technology that a company's manufacturing and sales organizations cannot exploit or one requiring a capital investment beyond the company's financial resources represents a wasteful diversion of the company's funds. Even in the case of basic research, some orientation is essential. True, the programming of basic research must provide for more flexibility than with applied research, but, nevertheless, the basic research should be restricted to the general field of a company's interest. I believe that I, as the research administrator in a company manufacturing containers, would have a difficult time explaining to a director why I had authorized an expenditure of $200,000 to isolate, identify, and synthesize the odoriferous sex attractant of the female gypsy moth. The results of such a research might be very valuable to a company producing agricultural pesticides, but they would be of little value to us in the container business. On the other hand, were I to tell a director that we had found that the composition of gases surrounding the steel in an annealing operation had a marked effect on the corrosion resistance of the resultant tin plate and that I had authorized a basic research expenditure to clarify the mechanisms surrounding the phenomenon, I believe he would have to go along with my thinking.

In the matter of evaluation, the more I see of attempts to arithmetically place a value on the results of research in terms of company profits, the more I am become convinced that they are nothing more than an exercise in mathematics. The generation of technology in a research and development operation is very similar to prospecting for oil or minerals. Let us assume that in a prospecting operation a substantial body of ore has been uncovered. It has no value to society until it is exploited and this requires capital investment together with the combined efforts of the operating and sales departments of the company. Now if operations are carried on inefficiently and the cost of extraction is so high that there is little profit to be realized in the sale of the product derived from the ore, who is there to say that the prospecting group acted ineffectively? Or if the sales organization is incompetent and either cannot find a market for the product or must dispose of it at distressed prices, is it fair to criticize the prospector? On the other hand, if the sales department performs admirably and the operating department extracts and refines the ore at the lowest possible cost, can the prospector rightly take credit for all the profits that the company derives from exploitation of the ore body? The research and development organization is just one of several departments in a company that contribute to the company's profits and competitive position. If in this day and age a company is level with or ahead of its competitors and is producing a good return on its sales income and invested capital, one can take it for granted that its research and development function is well managed and performing satisfactorily.

A. E. Snyder[6]

The research director and other managers of creative technical and scientific research personnel who are interested in evaluating their methods and techniques in management will find the paper of Dr. Work very interesting.

I would first like to mention that as a Director of an Industrial Research Operation I find the definition that the author has applied to industrial research to be a very acceptable and descriptive definition: namely, "that applied research is research undertaken by an industrial organization for the purpose of holding or improving its position in a highly competitive market." American industry has in the last decade wholeheartedly accepted this definition and indications of this are everywhere; as the author has pointed out, the proof of this new born recognition of the process of discovery is evident by the amount of investment in the Research process which business has been willing to make.

I would also like to comment upon the items which Dean Work identifies as the major considerations in research management. These were:

1 Judicious choice of the research to be undertaken.
2 Wise selection of research personnel.
3 Good utilization of available scientific talent.
4 Adequate provision of research facilities.
5 Realistic programming and integration of research with over-all company objectives.

As I have discussed before, the amount of research investment by industry has increased remarkably during the past decade and the act of systematic investment in the "process of discovery" through research has become a regular part of the business venture. This investment now amounts, in many cases, to a large percentage of the total cost of doing business and, in fact, the whole future of a business enterprise may hinge upon the competency of the management of the research function.

The qualifications of a research director have, of necessity, changed within a very short period of time, possibly one or two decades. The industrial research director can no longer play the role of the scientific or academic investigator with some degree of executive ability. He must instead be a professional business manager, a member of the business management team, and a leader of creative technical personnel. In addition to the function of acting as a liaison between the research operation and company management as Dr. Work has described, the research director must also use the latest scientific business management techniques to conduct his operation in the most efficient and effective manner in order to obtain the most research for his company's investment.

The study of the research management function reveals that research management can be divided into the same major categories that any of the other management functions of business can be divided into. Namely:

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1 Planning
2 Organizing
3 Leading
4 Measuring

If the research director conscientiously measures his operation by diligent self-monitoring of his own performance in these basic elements of the research management work function, then he will automatically accomplish all of the desired results that Dr. Work discusses in this paper and identifies as "major considerations." I should like to comment upon this further by briefly describing these four functional divisions of research management.

The planning function of a research director comprises the following activities:

1 Forecasting and assessing future conditions (economic, social, technological) to determine their probable influence on projected activities of his operation.
2 Setting objectives and establishing specific quantitative goals for the operation.
3 Programming and stating clearly in writing the specific sequence of activities to be followed in reaching the research department objectives.
4 Establishing a time sequence or completion date for the research activities.
5 Setting procedures and stating uniform methods to be followed in performing designated work.
6 Allocation of research resources including materials, manpower, and facilities by budgeting.

The organizing function of the research director consists of these activities:

1 Development of an organization structure, which is compatible with the work to be done in order to accomplish the goals that have been set; and by grouping of the work to form well-balanced organization units. Into each position within each group must be built a responsibility to accomplish the over-all goals of the department.
2 Delegation or assignment of responsibility, authority, accountability to every person reporting to him.
3 Establishing relationships which distinguish between line and staff functions and clarification of relationships amongst subordinates.

The research manager leads by:

1 Introducing or initiating original action.
2 Making conclusions and judgments based on the logical analysis of all alternatives and the judging for the group as a whole.
3 Communicating his ideas, beliefs, policies to others while understanding the ideas and beliefs of his subordinates.
4 Motivating personnel and by establishing conditions to stimulate.
5 By choosing the right man for the right job.
6 By developing people and by careful appraisal of individual performances and through subsequent counseling and coaching.

Finally, the measuring function of the research director consists of:

1 Establishing standards of performance which are yardsticks that the research director then uses to assess the work of the people who report to him.
2 By reporting and recording the work in progress and by measuring performance thereof.
3 By comparing actual performance of the department against desired results.
4 By taking any corrective action that is necessary to bring exceptions, whenever they may occur, into line.

In conclusion and speaking very generally, I believe that a good research executive is one who handles a research program effectively, extracting maximum benefits over a period of time for the development of new products or processes. Thus, in order to qualify as a research executive, the research director must possess all the general qualities desired in good business managers. In addition, he must have a good scientific background, the ability to inspire technical people and last, but not least, he must have a good gambling instinct.

Author's Closure

I am in complete accord with Dr. Lueck's comments—except on the one point which he mentions—the definition of "industrial research" and whether or not it includes basic research. Here I think our difference is just a matter of semantics. To escape confusion of this sort some companies avoid use of the term "basic research," using instead pure or fundamental research.

Concerning Mr. Snyder's comments I agree with him that the modern research executive must be a combination of business manager and scientist or engineer to adequately meet his obligations. The specific details of what the executive does, however, depend on various factors such as the size of the organization, the specific organizational plan, administrative personnel available, and the like.

Practices in Operational Management—Engineering Management[1]

C. E. PAULES
Vice-President of Engineering (Ret.), Esso Research and Engineering.

Inherent in the history of the engineering profession has been constant advance in its methods of carrying out its tasks and ever-improving quality of its work output. In this country, it has played a major role in aiding in the development of the United States into its leading industrial position. Seldom in our history has the engineer been confronted with a challenge—to think and to perform—equalling that of the past decade.

Challenges of the Changing Decade

It had become apparent, at the opening of this period, that the cold war was here. Government action for building up an adequate defense was under way. Then came the Korean war. Planned engineering activities had to be modified quickly to meet the changed demands placed on the profession.

At the end of the Korean war, there was a return to a peacetime activity, but one still affected by the cold-war situation. As the Russians achieved success in development of the atomic, and later the hydrogen bomb this condition became more critical. Industrial activities had to be continually modified to meet the changing requirements. Engineering activities had to keep pace with these changing requirements.

In the field of the Armed Forces, the development of new forms of nuclear weapons, nuclear propulsion of ships and planes, rocketry, and the entire field of space exploration have placed tremendous challenges to the engineering profession. The vast amount of research done in these and similar fields has resulted in the need for new materials, designs, and fuels.

At the same time, industry began to adapt for commercial use many of the wartime developments. Harnessing the atom for peaceful use has made progress principally in the field of power generation. The first commercial nuclear propelled merchant ship has been launched. Electronics has permeated a large segment of our industrial activity. A large portion of the manufacturing and processing operations is now controlled in this manner. It has made possible the development of the fabulous high-speed computers which are revolutionizing our business activities.

Automation surged forward during this period. The first fully automated automobile assembly line came into operation in 1951. Now that same company has seven such lines. While the social problems associated with automation are now most prominently before the public, the development of such equipment, and plant reconstruction to accommodate it kept engineers fully occupied.

While research carried out by, or for, government was growing at a terrific rate, research by industry for its own uses kept pace. This activity brought forth new products and new methods for making old products. Each of these placed on engineering the responsibility for finding answers to the many problems which had to be solved in order to convert them from interesting research findings to useful commercial operations.

This has been a period of expansion and diversification often marked by mergers; small companies have grown large, and large ones have become larger. Many have come from a single plant to multiple plants in scattered geographical locations.

With industrial recovery in foreign countries, particularly Europe and Japan, international competition from these countries has presented a serious challenge to our export markets and even, in many cases, to our domestic market. This has resulted in expansion of manufacturing activity by many domestic companies previously operating in foreign fields and the entry of many more into such operations.

The expansion of both defense and industry needs with the resultant growth of plant facilities, the emergence of new products, many of increased complexity, sometimes resulting in obsolescence of old plants, have resulted in increased participation by engineers in aiding industry to attain improved budgeting, return-on-investment studies, plant-location selections, and project-planning and handling procedures.

This industrial expansion has resulted in need for increased management personnel in many fields of operation. Engineering departments have served as a fertile source of qualified individuals for filling such positions. Men with industrial engineering training are playing an increasing role in this respect.

Ever-increasing competition, taxation, and other factors have had a tendency to cause upper management to view engineering costs with increasing concern. In too many instances, this has been done without appreciation of the increased degree of participation by engineering into many phases of activity not strictly classed as engineering by earlier thinking; product-quality considerations and assistance to sales departments to mention only a few. Then too, cheaper designs for new plant construction result only from a greater expenditure of engineering effort than if conventional practices were adhered to.

Engineering Procurement, Training, and Organization

This impact of changing technology and its explosive nature have generated many acute problems of engineering management. The sensitivity of the engineering profession to need, and challenge, and opportunity, has enabled engineering management to face up to its challenge realistically and adequately.

These conditions arose at a time when the number of engineering graduates had dropped to an alarmingly low level. This situation continues and there is fear in the minds of many that the continuous emphasis on encouragement of more and more of the young to enroll for scientific courses may cause difficulty in maintaining engineering enrollments at their present level let alone increase them as should be done.

[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

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This scarcity of graduates has brought about a tremendous change in recruiting practices. No longer does the graduate have to sell his services. On the contrary, many companies try to sell themselves to him. He visits various organizations, sometimes from coast to coast. He is often lavishly entertained. This places a heavy burden of expense on engineering departments but, more importantly, takes away from productive engineering effort a large amount of time on the part of high-caliber engineers, as the efforts of the best men are needed to impress the prospects.

Progress is made most rapidly under conditions of pressure and engineering management made rapid progress in measuring up to these challenging requirements. The shortage of engineers brought home the fact that each, to the maximum extent possible, had to be free to devote his time to truly technical matters. Analyses showed that, in far too many instances, this was not the case. Graduates who had majored in mathematics, semiprofessional, and even nonprofessional personnel, were able to make great contributions in improving this condition. High-speed computers, of course, made their contribution.

Newly hired graduates represent an investment of quite a few thousand dollars each under the highly competitive conditions prevailing. Not only because of this but, even more importantly, because their services were so badly needed, every effort had to be made to avoid losing them. The most effective way to build their enthusiasm for their work is, as rapidly as possible, to bring them to a state where they can recognize that they are truly making a contribution to the work of their organization. This program was carried out in different ways. Full-time training courses, part-time courses, and entirely on-the-job training were resorted to. The latter placed an added burden on the experienced engineers but, where they were convinced of the importance of the problem and gave their wholehearted co-operation, the results were most effective.

In spite of the utmost care exercised in recruiting, it was inevitable that some should not measure up to their particular job requirements. All were carefully reviewed from the start of employment. In many instances, weaknesses which showed up were corrected after discussions. Sometimes a change to a different kind of work was effective. Where improvement did not result, terminations were necessary.

Not only was this necessary with the new employees, but the increased burden on the engineering organizations to operate economically, as well as effectively, resulted in increased attention to reviews and ratings of all employees. Some, unfortunately, could not keep pace with the increasing complexity of the work and had to be encouraged to look elsewhere for work in keeping with their abilities. Fortunately, in most instances, this was possible and resulted in contentment for the man by working within his own limits. Particularly important was the individual who, for some reason, was not putting forth his best efforts. Such individuals had to be disposed of, as few things are more destructive to the morale of an organization than this type of person. He is readily recognized by his fellow workers, sometimes earlier than by his supervisors and, where action was not taken, their respect for management suffered.

New graduates frequently find it necessary to take specialized courses to acquire knowledge not covered in their collegiate background but essential to the field of work into which they have entered. More experienced engineers too find need for courses of study to keep them abreast of rapidly changing technology. Engineering schools have greatly expanded their night school facilities, which go a long way in meeting this need.

The practice of industry aid for carrying out such studies dates quite far back, but it has been greatly expanded. Many employers have, for a long time, paid part of the cost of these courses. Employer contributions have been increased to cover a greater part and, in some cases, the full cost. In some cases of highly specialized need, employees have been sent to universities for a semester, or a year, with all costs paid and salary continuing.

Where adequate night school courses have not been available, employers have often arranged for special courses at their own facilities. The services of qualified faculty members from colleges and universities are secured to handle these.

Need for increased numbers of engineering management personnel, resulting both from growth of the organization and from transfer of engineers to other fields, made it extremely important to take adequate steps for training men for supervisory and management positions. All personnel were carefully studied to select those who possessed the proper characteristics. Steps then were taken to train them first for entry into supervisory work and then to equip them for moving up to higher levels. This was done in many different ways. On-the-job training was supplemented by special courses conducted in some cases by management personnel and, in other cases, by management consultants. Many attended management courses given by colleges and universities and seminars held by management advisory organizations.

Equally important was the problem of encouraging an adequate number of outstanding technical men to remain in nonsupervisory work, and develop into true experts in particular technical fields. Unfortunately, management gave increasing public recognition to supervisory appointments, often even at the lower levels, and these were frequently supplemented by perquisites. As a result, many excellent men, thoroughly interested in technical work, requested supervisory assignments solely in order to receive recognition. The assurance that they were being paid equally to their management counterpart, as was often the case, was not enough. Recognizing the seriousness of the problem, management in many cases took steps to correct it. Technical titles were selected and publicized along with their administrative title equivalents. Appointments to these titled positions are frequently given the same publicity and perquisites as the corresponding supervisory appointments and, at least in some instances, equivalent salary treatment is given. Whether this is true in all cases where the practice has been adopted cannot be told but, unless this is so, the chances of success are dimmed. Results to date have been encouraging where tried but to effect a major impact on the profession as a whole will require much broader application and a sincere desire on the part of management to demonstrate equality of reward for equivalent administrative and technical contributions.

Organizations were studied carefully to see whether they were adapted to the increasingly complex needs. In many cases, vertical organizations existed with many levels of supervision. This frequently resulted from adding more and more levels of supervision as a department grew. Revised organizations of the horizontal type with fewer levels of supervision have increasingly resulted.

The organization chart is recognized as merely the beginning in optimum utilization of engineering talent. The need to define clearly the responsibilities of each level of supervision and the necessity to delegate authority necessary to these responsibilities has been seen and acted upon by many, but much remains to be done.

New Working Tools and Methods

The profession has been alert in taking advantage of the many new "working tools" which have become available. High-speed computers are in general use. These not only save valuable engineering time but, in many cases, their greatest value lies in permitting the engineer to explore a whole field of alternative possibilities and select the one which will result in optimizing

capital and operating costs consistent with maximum economic advantage.

Systems engineering has been widely adopted with economic advantage in plant design and control. Industry made a start in the application of "operations research" during the preceding decade and has greatly expanded its use. Unlike some early concepts that this could function best when carried out by persons with no knowledge of the problem, it has been found that best results are attained by teamwork. A team consisting of engineers possessing OR background, and engineers and others skilled in the nature of the problem studied, has been found most effective. Problems of material shipping and receiving, scheduling of shipments, inventory controls, were among the early applications. As business management began to see the benefits of this type of approach, its application was expanded to many other fields. Most recently, studies of long-range corporate financial planning have been undertaken.

While not new to this decade, the task-force concept has been much more extensively applied. Here persons of different intellectual capability and experience are assembled to bring their combined knowledge to bear on given problems. When they have completed their work on the problem at hand, the force is disbanded and the personnel reassigned. Such a task force may be assembled on a purely engineering problem; for example, a plant design. It will consist of engineers of varying skills and degrees of experience, designers and draftsmen, and the necessary supporting nontechnical personnel. Other task forces may involve personnel from several phases of the business. The selection of a site for a new plant, for example, may include in its task force engineers, experts in land and water transportation, marketers, and economists.

Work by task force or normal organizational method results usually in lowest engineering cost if carried on step by step in sequence to completion. There may be, and are in many cases, sound reasons for deviating from this practice. What some refer to as the "principle of concurrence" has been increasingly resorted to in this decade. Here a job is separated into its components and the work carried along simultaneously. This is sometimes done as a matter of expediency if the work load among groups is out of balance. More importantly, it can lead to earlier plant completion and the start of profit making which will more than offset the increased engineering cost.

The need for well-planned, adequate working quarters as an effective working tool for engineers has been increasingly recognized, and engineering management has been increasingly successful in convincing upper management of this need. The greater complexity of the work, and the need to maximize the output of each technical man has focused attention on the inefficiency resulting from large numbers working in large rooms and from having the engineering force split in several buildings. Not only do such conditions result in increased engineering cost, but they increase the chance of errors which may result in increased construction and operating costs as well as delays in getting new plant equipment into operation.

By these various means, engineering management has done much to improve the efficiency of its operations and hold its costs down in spite of greater engineering requirements resulting from increased complexity of products and the increases in salaries resulting from the short supply of engineers.

Reliability Engineering—Quality Control

Engineering has carried an increasing responsibility for product quality. This has increased the degree that "reliability engineering" has evolved as one of the new activities of the decade. Increasingly complex products with an ever-growing number of component parts are creating more and more severe dependability requirements. Requirements for existing products become increasingly severe so that the user can have greater benefit from them. New products are expected to possess better properties than existing ones. Old standards of establishing over-all requirements for finished products no longer suffice. Quality of each of the many component parts must be rigidly established. Designers of new plants have recognized these conditions and have designed accordingly. Production and assembly techniques have kept pace. With the full assurance thus attained as to the quality of each component part, the quality of the finished product is assured to a much higher degree than at any time in the past.

Budgeting

The rapid expansion of so many companies, involving plant expansions and increased numbers of plants, the introduction of new and often complex products, plant construction in foreign countries, and the ever-increasing competition at home and abroad, have increased tremendously the top-management burden of planning its financial operations wisely. Budgeting, project selection, and project planning and control have become more critical, and engineering management has kept pace with improved methods to carry its share of this burden.

Sound budgeting is, of course, dependent on estimating. This has been a period of inflation with rising prices over all, but occasionally, some declines. Contractors' work loads in various fields have varied over wide ranges with resultant variations in contract bids. Estimating groups have developed improved methods of analyzing indexes and price data and of predicting future trends based on these analyses and a comparison of present conditions with those of the past. To the operating company, these afford better budgeting. They are the life blood of the contractor as they, in large measure, determine whether he secures a contract and, if so, whether he makes his anticipated profit.

Where a company or a contractor operates in foreign countries, the estimating work, now frequently called cost engineering work, has become increasingly complex. Not only must separate data be compiled for each country but, of even greater significance, the relative costs in any two countries change with time. Continual attention has had to be given to business and economic conditions in each country where work is performed.

Additional problems are involved for the estimator in foreign construction. It is good practice and, in fact, many countries require that the maximum amount of materials and equipment be purchased locally. This requires a knowledge of manufacturing facilities; not only ability to provide the quality, but also the volume needed to meet a reasonable schedule. The budgets must reflect the sources of supply which will be used and provide for the cost of importing what must be purchased outside the country. Purchasing and engineering departments have increased their activity in this respect so that estimates may be based properly.

The improved techniques have enabled management to do a more effective job in optimizing the budgeting of its funds without undue risk from substantial overruns and without tying up excessive capital as would have been the case had large underruns resulted.

Project Selection

Project selection is not an engineering function, but engineering does play a prominent and useful part.

If a research development is to be capitalized, preliminary designs and estimates of capital and operating costs are needed to enable reasonable evaluation of its economic attractiveness.

Even though preliminary, these designs must recognize and find solutions for the many special engineering problems which arise in such developments. The many steps taken to relieve engineers of routine chores have aided in giving them the time needed for this important activity.

More time has been spent in analyzing plant operating and research data in an effort to find ways of increasing the output of existing plant. Especially in industries processing large quantities of raw materials, such studies have led the way to plant changes and additions, which have resulted in most substantial increases to throughput often obviating the need for a new unit. Such "bottleneck" programs result usually in a lower cost per unit of capacity than would be the case for new construction. Even where there is no such capital saving, the other advantages still apply. No new land is used; there is usually a saving in utility consumption; and labor remains unchanged.

If a new plant is to be constructed, engineering works with many other functions in selecting a site. The first thing thought of is soil conditions. This is only one of the many angles which the engineer needs to investigate. Many others need be studied. The feasibility of bringing in rail connections if needed and not immediately accessible; availability of potable and, if required, processing water; availability of adequate and dependable electric power; possibility of delivering to site large and heavy equipment or, alternatively, the need to deliver in parts and assemble on site; air and water pollution and other local regulations; availability of construction and operating labor, skilled and unskilled; all of these need most careful study in site selection. They determine the feasibility, or otherwise, of a given site, and knowledge of them is essential in budgeting plant cost.

Where the new plant is to be in a foreign country, investigation of labor availability and customs is particularly important. Construction camps are frequently necessary. The cost of building and operating them has a significant effect on plant cost. Sometimes permanent housing for operating staff must be built in full or in part. Construction labor is not accustomed to our equipment and methods. Owing to the large amount of U. S. construction abroad in recent years, much progress is being made but many local practices must be recognized and adhered to.

Project Management

Advances have been made in the techniques for planning and carrying out the project once it has been formally approved. The economic necessity of planning for optimum construction cost, and for the earliest practicable readiness for operation, has been better recognized

Designs have reflected an increasing awareness on the part of both engineering management and the design engineers of the need for economy in order that our capital structure may be able to provide for the continuing demands of the industrial expansion. One of the significant achievements of the period has been in getting engineers, as a whole, to accept this as a fundamental requirement in all their work.

With the stress on economy, management has had to guard against building up the philosophy that the cheapest design is necessarily the best one. Increased investment, which will reduce operating costs, will often show a handsome return.

Designs incorporate all the new developments which will aid in economic optimization. Automation is, of course, resorted to wherever it applies. Electronic or other controls are utilized to the utmost to minimize manpower requirements and for quality control to keep to a minimum off-specification products which will need to be reprocessed or discarded.

Plant layouts are carefully developed to result in most economical construction, to provide ease in operability and in such manner as to facilitate economical expansion with minimum downtime of operating equipment. If it is likely that expansion will be needed before very long, some extra money spent initially in site development and utility systems is well justified.

The question of lump-sum versus reimbursible cost-plus fee contracts remains an open one. Both have their place. An analysis of existing conditions and contractor work loads usually permits a firm conclusion as to which is best for a given project. Where the reimbursible-cost type is used a fixed, rather than percentage, fee has come to be recognized as better for both parties. The freezing of part or all of items such as engineering costs, field overheads, field supervision, construction tools, and equipment, has become increasingly prevalent.

The importance of a realistic schedule for completion of a project, and most rigorous followup to assure meeting it, has been increasingly recognized. An optimum schedule is a "tight" one, which can be met only by close adherence to every step from engineering through procurement and construction. Engineering must be so scheduled as to permit ordering of materials and equipment at such times as to assure delivery sequence which will meet construction schedule needs. Rigorous expediting is required to be sure that delivery promises will be met. Field manpower requirements should be established in ample time to permit steps necessary to have the correct numbers of men of the proper skills available when needed. Although this is the contractor's responsibility, where one is involved, the owner's engineers should assure themselves that it is being adequately fulfilled.

Improved budgeting practices, good designs recognizing overall economics of construction and operating costs, selection of proper contract procedures, thorough scheduling and followup through the entire job period have enabled industry to meet its tremendously expanded program at reasonable investment cost.

Conclusion

Much has been accomplished during these years by streamlining organizations; improved training for engineers; freeing them of routine chores to make their time available for truly technical work; by making them increasingly cost conscious; by more thorough planning of work; and by utilizing the many techniques and "working tools" which have become available. Much more remains to be done in securing their maximum benefits.

DISCUSSION

H. M. Miller[2]

While there have been no great break-throughs in the theoretical background of the management of engineers during the 1950's, there has been considerable change in its practice. This is the result of the urgent engineer shortage and—I would like to feel—the increasing understanding of the function of management in its relationship to engineer productivity. Mr. Paules, as might be expected, has produced a trenchant, painstaking, perceptive review of these practices which have undergone change.

Implicit in this paper is the important fact that management is realizing the necessity for recognizing the engineer's needs and helping him integrate his personal objectives with those of the organization. This presumes, of course, salient definition of organizational goals and repeated examination to assure their continuing pertinency. Indeed, the lesson we appear to be learning is that the essential practices of engineering management are definition of organization objectives, recognition of the engineer's needs, then integration of the two.

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Accumulation of data giving evidence of greater compatibility than might be supposed between these two essentials is one of the engaging developments of the 1950's. For example, one of the work factors determined to be most important to the engineer is the opportunity to do creative, challenging work. Obviously this is in keeping with many engineering organization objectives—the problem lies in its frustration by management practice. Other studies have shown that engineers engaged in development and application feel that their most significant intangible rewards come from seeing their ideas put to use and by having freedom to manage their work. Again, these appear to be more in keeping with organization objectives than with some of the problems of management itself.

The happy indication is that the management function is coming into better perspective, and in more and more instances is losing the rigidity which deprives the organization of the opportunity and incentive for its employees to contribute more effectively to its objectives. We are becoming more alert to the utilization of this valuable resource; we are more concerned about encouraging and providing aid to an engineer's self-development. We are more alert to new tools and techniques to extend his value. We are realizing more and more, as Mr. Paules implies, that their management is a discrete function which for success must depend on recognition of and accommodation to the varying needs, goals, and abilities of the individual engineers.

Author's Closure

I am thankful for Mr. Miller's excellent discussion of my paper. There is ample evidence in support of his belief that there has been an increasing understanding of management's function in its relationship to engineering productivity.

One of his points can be demonstrated by setting down in parallel columns "What the engineer can properly expect of his employer" and "What the employer can properly expect of the engineer." The complete compatibility of the two is clearly evident.

While engineering management itself has made marked advances in its appreciation of the points discussed by Mr. Miller there is evidence that in many cases there has not been the same appreciation on the part of upper management. As a result the full benefit of improved efficiency has not always been attained. The coming decade will undoubtedly show continuing improvement.

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Practices in Operational Management—Manufacturing Management[1]

THE decade of 1950 to 1960 witnessed a number of major technical advances in manufacturing procedures. Productivity was increased importantly both through automation and the simplification of manual methods. Good plant layout was increasingly recognized as a means of securing "built-in" efficiencies. Improved work measurement procedures permitted the measurement and control of indirect as well as direct labor. Initial attempts to measure supervisory and engineering activities gave promise of coming advances in these areas. Cost-reduction activities where properly organized were outstandingly successful. Wage-incentive methods were improved and older out-of-line installations were revamped. New developments were introduced in inventory management and production planning and control. Statistical quality-control procedures were widely applied and quality improvement through thorough operator training was found to be realizable.

But the technical developments often surpassed management's readiness to use them. Thus progress in manufacturing was spotty, with brilliant successes and dismal retrogressions at either end of the spectrum. The reasons for this are correctable, however, and, if managers in the 1960's will concentrate on the adoption of new techniques as they come along and the solution of the "people" problems of which they themselves may be a part, there is every reason to feel optimistic about the continuing strength of the American economy.

Introduction

The decade of 1950 to 1960 witnessed a number of major technical advances in manufacturing procedures. Never before had the manufacturing manager available to him so many tools for getting his job done effectively and at a low cost. Indeed, one of his major problems was to utilize properly the available techniques so that he would remain competitive costwise with his rivals who also had available these same techniques.

The decade made it increasingly evident that the human problems involved in manufacturing were much more difficult to solve than the technical problems. The machinery, technical know-how, and necessary capital were increasingly available to turn out needed products in any desired quantities. But the running of this magnificent machine at full efficiency was hampered in many companies by "people" problems of considerable magnitude.

Work Methods and Automation

The decade saw increasing recognition given to the importance of effective work methods. Harlow Curtis, while still president of General Motors, pointed out ". . . that no strike, no war, no disaster can so completely and irrevocably destroy a man's business or his profits as better methods in the hands of an enlightened competitor." Most managers recognized the truth of this and sought to improve methods in many different ways.

One of the more publicized ways was through increased mechanization and automation. It was evident to everyone that if machines could be built to do the work of men, high-cost labor would be saved. The demand for labor-saving machinery resulted in new advances in tooling, processes, and automated equipment of all sorts. A number of specialist companies were formed to handle the design, manufacturing, and installation problems involved in automation, problems which were often beyond the abilities of a company's own tool and equipment designers to solve. These companies brought together competent machine designers, electronic experts, instrumentation specialists, and the like who, working as a team, could automate successfully a process or an entire plant.

Many automation installations caused initial difficulties to the companies that used them. The complex equipment required considerable debugging before it would work properly and continuously. A changed approach to maintenance activities was required to avoid costly shutdowns. More importantly, automation forced changes in inventory and production planning methods in the factory and forecasting and marketing methods in the front office. It emphasized the necessity for long-range planning, and added the factor of inflexibility to manufacturing.

In a less spectacular fashion, methods were improved during the decade in plants which were not automated either because the products and quantities involved were not suitable for automation or because management was not ready to incur the high capital costs and high risks which usually accompany automation. The familiar tools of work simplification developed in the two preceding decades continued to be used to good advantage by an increasing number of companies. With universities turning out large numbers of graduates who had had exposure to work-simplification philosophies, and companies conducting training programs in methods-improvement techniques, either internally or with the aid of outside consultants, methods of performing manual operations were steadily improved throughout the decade.

But in addition, a powerful new tool of methods improvement was introduced near the beginning of the decade. This was the tool called predetermined time systems. Several systems differing largely only in detail were introduced to industry at about the same time. Their use spread rapidly as their value became known. By the end of 1959, a survey showed that 33 per cent of the companies making use of methods-improvement and work-measurement techniques were using a predetermined time system for both purposes. Many others were using this tool for methods improvement alone. The impact of this new development became increasingly evident as the decade progressed, and it was widely used by both industry and government.

Plant Layout

The sharpened consciousness of the importance of methods caused increasing attention to be paid to plant layout during the decade. Many companies still followed the familiar pattern of

[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

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erecting an architect-designed building first and then fitting equipment into it as best they could. But an increasing number saw the advantage of doing considerable advance planning and study before committing the company's funds to inflexible bricks and mortar. Projections of requirements for as far as 25 years ahead were made in the more stabilized industries, and ideal layouts which could be expanded without loss of efficiency as the need arose were worked out carefully on paper. Only then was the architect called in to "wrap a building" around the facilities layout. This procedure resulted in built-in efficiencies which competitors with older plants found it difficult to overcome.

Work Measurement

Work measurement was used increasingly during the decade. A survey made by the magazine *Factory* in 1959 showed that 99 per cent of the companies surveyed made some use of work measurement. The most common use continued to be the measurement of direct labor. Time-and-motion study was the work-measurement tool most frequently used, but as the decade advanced, more and more attention was given to work sampling and predetermined time systems. These tools, properly used, proved of value not only for measuring direct labor, repetitive and nonrepetitive alike, but they were also found to be the answer to the economical measurement of indirect labor. By the end of the decade, enough applications of measurement to all kinds of indirect labor had been made to demonstrate beyond question the practicability of indirect labor measurement and to point the way to what will undoubtedly be the major area of work-measurement application in the decade to come.

The *Factory* survey showed that about one third of the companies surveyed were successfully measuring inspection, material handling, shipping and receiving, and janitorial work. About 10 per cent were measuring tool and die making and maintenance activities. Only about 5 per cent were measuring clerical activities.

But the applications that had been made showed that it could be done, and they attracted an increasing amount of attention as the decade drew to a close. For example, at the beginning of the decade it was almost universally believed that it was very costly and probably impractical to measure miscellaneous maintenance activities, if indeed it could be done at all. A few attempts to measure large maintenance departments, however, showed the tremendous potential for improvement that existed in this area. This led to a search for better, more economical measurement methods which eventually resulted in combining time study, predetermined motion times, work sampling, and certain statistical concepts into a successful maintenance work-measurement procedure.

A somewhat similar approach using predetermined time standards was also worked out for the measurement of clerical work. Interestingly enough, it was in the government rather than in private industry where the most extensive initial installations were made. The Department of the Navy in particular, when the 34-year-old antistop-watch rider was finally dropped from the Army and Navy appropriations bills in 1949, began actively to seek control over its vast operations through the use of work measurement. During the decade, it sought to apply work measurement to the activities which employed the greatest number of civilian personnel. In addition to the manufacture of armament items, this included maintenance and clerical activities. With the aid of outside consultants, the Navy succeeded in measuring these activities in a practical, economical manner and pointed the way to other government agencies to the use of work measurement in government.

But in addition to all this, some initial progress was made in the measurement of work which was predominantly mental in nature. Work sampling was used to determine the effectiveness with which such people as supervisors and engineers used their time and provided a basis for reorganizing their work for greater effectiveness. Work sampling and predetermined motion times were used to develop standards for certain kinds of engineering design and drafting work, standards which were then used as a basis for scheduling the work. This development, while in its infancy, may well have far-reaching effects in the decade ahead, particularly through alleviating the shortage of engineering manpower by the more effective utilization of that which is already available.

Cost Reduction and Control

The major purpose of methods improvement and work measurement continued to be cost control and cost reduction during the past decade. Often, cost reduction was entrusted to industrial engineers as part of their regular duties. A growing number of companies, however, established formally organized cost-reduction programs which included all levels of management, supervision, and staff functions such as tool design, inspection, accounting, quality control, and, of course, industrial engineering.

The success of some of these organized cost-reduction programs was outstanding. For example, one company doing an annual volume of business of approximately $50,000,000 obtained bona fide cost reductions in excess of $1,000,000 each year for the six years the program was in operation during the decade.

The government, too, found cost reductions through work measurement a practical reality. The Navy, for example, recognizing that the amount of money it could expect to receive as its appropriation was limited, sought to make that money buy as much strength for national defense purposes as possible. With this objective in mind, it aggressively applied work measurement for cost-control purposes, using it largely as a means of staffing various activities with the manpower necessary to get the work done. Wherever this was done, savings of 20 to 30 per cent and even more were reported, which meant that the Navy was able to have more weapons for defense than would otherwise have been possible.

The experience of the Navy with the measurement and control of clerical costs was particularly significant to private industry. At the beginning of the decade, 74 per cent of total labor costs in manufacturing was in wages; 26 per cent was in salaries. At the end of the decade, the corresponding percentages were 67 and 33. One very large company announced at the end of 1959 that, for the first time in its history, the number of its white collar workers exceeded the number of its blue collar workers. These statistics reflect the continuing trend during the decade to larger numbers of clerical workers. Although developments in the field of electronic computers gave some promise of relief from this problem, it began to become apparent that the immediate measurement and control of clerical labor with the relatively simple techniques which had been developed would yield quick and inexpensive cost reductions.

Wage-Payment and Incentive Plans

The decade saw some interesting developments in connection with wage-incentive plans. Many companies and the government used work measurement for cost-control purposes under a measured day-work type of plan without any form of incentive payment. The usual experience when measured day work replaced unmeasured day work was cost reductions of from 20 to 30 per cent. Other companies in private industry used work measurement as the basis for incentive wage payment. In these cases, cost reductions were more in the order of 40 per cent, with the workers themselves earning at the same time approximately 25 per cent more in wages.

These statistics represented new installations. Many companies had had incentive plans in effect for years. During World War II, a number of companies purposely allowed their standards to become loose so that they could attract and hold the manpower they needed from the limited supply that was available. When the effects of intensified competition were felt, particularly in the mid and late 1950's, these companies found themselves with uneconomical labor costs. The action they took varied considerably. A few went out of business. Some abandoned their wage-incentive plans and went to measured day work, usually an unsatisfactory solution. Others sought to escape from the situation by moving to another location or introducing increased mechanization and automation.

The most courageous faced up to the situation, and working with their union where one was involved took whatever steps were necessary to restore their wage-incentive plan to a sound condition. Usually this was not easy, but where this course of action was the only answer and management devoted persistent attention to the problem, eventually a satisfactory result was obtained in most cases. Their competitive positions were restored, and usually renewed growth followed.

The repercussions from some of these situations gave the impression that unions were generally opposed to wage-incentive plans. The *Factory* survey of 1959 did not confirm this. The survey showed that 64 per cent of the union officials covered by the survey tended to favor or actively favored and co-operated with the wage-incentive-plan installations, 26 per cent of the group tended to oppose incentives, but only 16 per cent actually opposed incentives with obstructing tactics. The evidence thus pointed to the fact that in the majority of cases wage incentives, properly introduced and applied, were found acceptable to those affected and definitely beneficial to the company as an economic unit. There was, therefore, an apparent slowly growing trend to the greater use of wage incentives.

Inventory Management

Labor and salary costs were not the only matters of concern to manufacturing management during the past decade. As management came to look on inventory as an investment rather than as a necessary evil, the concept of managing the inventory just as any other investment is managed developed, and the term "inventory management" began to be increasingly used. It was defined as a procedure for managing and controlling inventory costs so as to minimize the total annual expenses which arise from carrying the inventory investment, ordering material, and offsetting the effects of stockouts. Mathematical procedures were developed for balancing the cost of carrying inventory against the cost of not carrying inventory so that the quantity could be found at which total costs were at a minimum.

Where inventory management was undertaken, results were often impressive. Costs were reduced and working capital was released for other purposes. One company reported that the contribution to profit resulting from an inventory-management installation was the equivalent to the profit that would have been realized from the sale of an additional $15,000,000 of their products, provided the facilities were available to make them and the market was able to absorb the increased output. Thus, the concept of inventory management can be ranked as one of the important technical developments of the past decade.

But, of course, a number of inventory clerks were still necessary to manage the inventory by traditional hand-posting methods. To reduce the cost of doing this, the electronic-computer manufacturers began to develop computers designed to handle large inventories quickly and with a minimum of clerical effort. A number of advances were made during the decade in this area as manufacturers and users teamed together to develop new systems and the hardware to operate them. By the end of the decade, a number of installations were in successful operation, pointing the way to the further developments that may be expected in the future.

Production Planning and Control

Computers also introduced the possibility for improving on production-planning and control methods, and a number of companies made experimental installations during the latter part of the decade. Some of these were considered reasonably satisfactory and some were not, indicating that there is considerable development work yet to be done. But there seemed to be no question but that electronic devices could be developed which would greatly simplify the function of production planning and control.

Another important development was the application of the mathematical tool of linear programming to the scheduling of work. In plants having a large number of products and operations, this made it possible to develop optimum schedules which resulted in the minimizing of costs or the maximizing of output.

The effect of automation on production planning in some companies has already been noted. Planning no longer could begin at the time an order was received but had to be started months ahead with a forecast of what probably would be required later on. The element of risk thus introduced tended to increase the importance with which the production planning and control function was regarded.

Quality Control

Quality control, and in particular statistical quality control, during the past decade—where it has been conscientiously used (and this is important)—had begun to live up to the expectations of those who pioneered with it during the preceding decade. Most companies of any importance had installed quality-control departments. The statistical techniques of quality control were well known. Numerous training programs were available in universities, industry, and other private institutions. It seemed that quality control had come of age.

And yet many people seemed to be dissatisfied with the quality that was actually being attained. Some individuals were urging company presidents to have the quality-control function report directly to the top, something that commonly occurs when a function is not as effective as its proponents think it should be. It was evident to those who examined closely the products of industry that all was not well on the quality front. Indeed, an increasing number of voices were raised against household appliances that promised much but which would not work properly, automobiles that had to go repeatedly to the shop to be put in normal operating condition even when purchased new, beautifully plated metal products from which the plating peeled off in a short time, self-winding watches that stopped repeatedly, and so on and on.

Quality control had progressed rapidly in the past decade. Techniques had been simplified and made more practical, departments had been installed in increasing numbers, and many people had been trained to do quality-control work. Why then had people been asking themselves what had gone wrong with quality? Was it labor's indifference to doing a good job? Had management taken its attention away from quality? Or had the definition of quality and the factors which produce it been too narrowly drawn? By the end of the decade, it was beginning to be felt that perhaps all of these factors were causing difficulty. And management, recognizing its responsibility for total results, was beginning to consider what it could do to bring about improvement.

Operator Training

One factor affecting quality was obvious. The man doing the work had to know what the job was, how to do it, and what was demanded in the way of quality. Under the rapidly changing conditions which existed in industry during the past decade, this was not easy to ensure. No longer was it common to find a man spending a lifetime doing the same job, often after a prolonged apprenticeship period during which he learned it. Jobs were changed rapidly; methods were changed and improved repeatedly; new layouts, new processes, and new machines and tools were the order of the day. Under this situation of rapid change, it was evident that workers would have less time to learn, foremen would know less about what they were trying to teach, and there would be less practice opportunity at a given job, which in itself is a form of self-teaching. It could reasonably be expected that quality would suffer.

But once again, technicians were ready with technical developments to solve the problem. A superior training technique had been developed in Holland after World War II when it was necessary to train an almost completely new work force. The technique was brought to this country early in the past decade. Wherever it had been used, it had met with outstanding success. It had resulted in rapid learning and greatly reduced training time, something in the order of 4 to 1. And it had improved quality wherever it was used, because one of the things it emphasized was how to produce quality. So a quality-improving cost-reducing training technique was available during the past decade. The only problem was that it was not used as much as it might have been.

Utilization of Technical Progress

This points up something that applies to all technical developments thus far discussed. During the past decade, technical developments in manufacturing far surpassed management's readiness to use them. Perhaps ability would be a better word, ability in the sense of being able to adopt and integrate into the organization as accepted working tools all of the technical developments that could be used with benefit. The blame should not be placed on contemporary manufacturing management for this. It is a result of the fact that, during the past decade, technological progress outstripped the ability of people to make full use of the tools it provided.

The result has been that progress in manufacturing management has been spotty during the past decade. Many companies have made a great deal of progress on many fronts. But probably none of these companies has gone as far as it could on all fronts. And certainly some companies have made no manufacturing progress at all, but have even slipped back in comparison to their more alert competition.

This situation provides both a challenge and an opportunity for the next decade. Every company can advance and make progress if it will merely fully apply the technical developments of the past decade. There is no reason to believe, however, that further technical developments will cease to be made in the future. The companies that permit the gap between technical developments and their ability to utilize them to widen is going to find itself in difficulties in the next decade. Conversely, the company that seeks to keep abreast of new developments as they come along will strengthen both itself and the national economy. In view of the world situation likely to exist in the 1960's, nothing could be more important.

Top-Management Support for Manufacturing Management

The experiences of the past decade point to the absolute necessity for continuing top-management support of the manufacturing function. The cost of sales or factory costs customarily runs from 65 to 85 per cent or more of the sales dollar. The higher figure results in the profitless prosperity that so many companies experienced during at least part of the past decade. With manufacturing costs such an important part of the total costs, top management cannot afford to take manufacturing for granted.

During the past decade, there were many developments, discussed elsewhere in this report, which tended to distract top-management's attention from manufacturing. Many top managers tended to become increasingly preoccupied with such activities as long-range planning, improved return upon invested capital, the promise of operations research, computers, marketing and market research, and a host of other interesting developments. All of these things were important, but it was unfortunate if they were permitted to distract attention from the problem of producing a quality product that customers would buy for a price which resulted in a fair profit. It is difficult to believe that inefficient methods, featherbedding, and other practices resulting in high costs and inferior quality would have been permitted to exist had top management devoted adequate attention to the manufacturing function.

Supervision

During the past decade, it was felt by many that first-line supervision often left a great deal to be desired in many companies. In spite of elaborate foreman training programs, the level of foremanship skill as a whole probably did not progress during the 1950's, and may even have gone backward.

Part of this was due to the lack of availability of good foreman material. In earlier decades, many men of high intelligence and potential leadership ability were to be found in the factory, because the economic situation of their families had not permitted them to continue long with their education. By the end of the past decade, nearly everyone who wanted to and had the necessary qualifications could go to college. These people upon graduation did not seek factory employment for the most part, but instead went into white collar work which was easy to find. As a result, it was increasingly difficult for the manufacturing manager to surround himself with capable assistants, and this in turn tended to slow up manufacturing progress.

Manufacturing Management

These trends, which developed in the 1950's and which are more clearly discernible in retrospect than they were when they were gradually emerging, help to explain why progress in manufacturing was spotty—with brilliant successes and dismal retrogressions at either end of the spectrum. But they do not relieve the individual manufacturing manager from the responsibility for making progress in the future. He has many, many tried and proved techniques at his disposal. It is his responsibility to see that they are properly introduced and used.

It is his further responsibility to win the active support of top management for the things which he believes will best serve his company's interests. And, in addition, he must seek to find solutions for his supervisory problem, for he cannot let second-rate supervision hold back the march of manufacturing progress.

The solution to some of these problems may require new concepts and fresh approaches. It is the manager's responsibility to find them. For example, one manufacturing manager in 1959 experimented with running his shop without foremen and got excellent results. He carefully analyzed the supporting work required to get out production and distributed many parts of it to people who were not foremen but who were quite capable of doing it. The truly management part of the work he placed in hands of a relatively few high-grade managers. The outcome was greatly improved manufacturing results.

There is no reason to believe that progress in the next decade in manufacturing management cannot be considerably greater than

it was in the past decade. The wave of technical developments of the 1950's will undoubtedly be exceeded in the 1960's. If managers will concentrate on the adoption of new techniques as they come along and the solution of the "people" problems of which they themselves may be a part, there is every reason to feel optimistic about the continuing strength of the American economy.

Bibliography

1 H. B. Maynard, "Industrial Engineering Handbook," McGraw-Hill Book Company, Inc., New York, N. Y., 1956.

2 G. B. Carson, "Production Handbook," Ronald Press Company, New York, N. Y., second edition, 1958.

3 T. G. Rose and D. E. Farr, "Higher Management Control," McGraw-Hill Book Company, Inc., New York, N. Y., 1957.

4 R. O. Ferguson and L. F. Sargent, "Linear Programming," McGraw-Hill Book Company, Inc., New York, N. Y., 1958.

5 R. Muther, "Practical Plant Layout," McGraw-Hill Book Company, Inc., New York, N. Y., 1955.

6 R. E. Heiland and W. J. Richardson, "Work Sampling," McGraw-Hill Book Company, Inc., New York, N. Y., 1957.

7 H. B. Maynard, G. J. Stegemerten, and J. L. Schwab, "Methods-Time Measurement," McGraw-Hill Book Company, Inc., New York, N. Y., 1948.

8 G. B. Bailey and R. Presgrave, "Basic Motion Time Study," McGraw-Hill Book Company, Inc., New York, N. Y., 1958.

9 R. M. Barnes, "Motion and Time Study," John Wiley & Sons, Inc., New York, N. Y., fourth edition, 1958.

10 J. K. Louden and J. W. Deegan, "Wage Incentives," John Wiley & Sons, Inc., New York, N. Y., second edition, 1959.

11 H. B. Maynard, W. M. Aiken, and J. F. Lewis, "Practical Control of Office Costs," Management Publishing Corporation, Greenwich, Conn., 1960.

12 D. H. W. Allan, "Statistical Office Control," Reinhold Publishing Corp., New York, N. Y., 1959.

DISCUSSION

J. Keith Louden[2]

Mr. Maynard's paper represents an excellent summary of what has been accomplished in the past decade and holds forth for not only improving on what has been learned but in carrying forward and refining these practices and extending their uses.

He points out, and rightly so, that technological advancement has outstripped management's ability to manage and understand the nature of these technical developments, their potentials, limitations, and proper usage.

This emphasizes the importance of competency at all levels of management, not only in the manufacturing process but other functions as well. An interesting point he makes is the fact that in the past decade or two, people of real ability who had a desire for a college education were able to achieve that ambition. This meant that they moved into other areas of industry than the ranks of the workers, from which so many foremen are drawn. This has tended to lower the level of foreman talent available in the face of rapidly advancing technical aspects of manufacturing management.

As Mr. Maynard indicates, an increasing number of management people are recognizing that we must put our very best people into the foreman ranks, recognizing the requirements, both in prestige and compensation. They are learning to their satisfaction that when this is done, they can do a better job with fewer men.

As would be expected, automation and accelerated improvements in manufacturing processes have been emphasized strongly during this past decade in our effort to cope with rising costs and the impact of foreign competition with their advantages of much lower labor rates and more favorable tax structures than exist in this country.

Many managements have learned, sometimes the hard way, that the use of automation and more mechanized processes has to be studied very carefully since many times you can be locked in on a design which may become obsolete earlier than would be expected. Automation in its truest sense seems to lend itself more practically to the processing industries rather than to what might be called product industries. Basic operations when automated and de-skilled, if you will, permit more rapid training of personnel, the operating of a larger number of machines, and the improving of quality.

Inventory management is discussed, and well it should be since it offers some of the greatest opportunities for cost reduction in a host of forms plus better service to the customers than is possible in situations where inventory is looked upon as a necessary evil. I would urge that not only manufacturing management but general management examine this great potential and consider ways and means of gearing it more directly to actual sales rather than forecasted sales.

Another important factor that has become prominent in the last year or two has been the growing recognition that the function of marketing is a primary contributor to profits. This has led management to recognize that every element of the corporate operation must be oriented towards marketing. This means that the marketing function must find out first what the customers want and then, based on this determination, gear the entire organization toward filling that want. Thus all functions of the corporate structure, including manufacturing, become service functions to marketing which is geared toward producing the right product for the known market, having it available in sufficient quantities, at the right place, to know how to motivate its sale, and how to distribute it.

This concept calls for greater co-ordination and teamwork than ever before in the history of American management. It includes the manufacturing executives looking beyond the concept that manufacturing is the beginning of all wealth in all business activity and to recognize that is not the end but only a vital part of a total corporate process. They must become specialists in manufacturing but generalists in total corporate management to properly fulfill their function as a service agency to marketing in the total corporate concept.

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Author's Closure

Mr. Louden's comments on the importance of marketing are well taken and help to place in proper perspective my own discussion of manufacturing management. It may be well to close, however, by reiterating one point made in my paper. Management should not allow itself to become so interested in the fascinating challenges offered by modern marketing concepts that it gives insufficient attention to the ever important problem of low cost manufacture.

In my own personal experience, particularly recently during recessed business conditions, I have heard the presidents of many companies—and particularly the smaller companies—complain that they have been going through a period of profitless prosperity. The objective they most often express as a means of achieving a reasonable profit is increased sales. "If we could only increase our volume by X per cent," they say, "we would be able to make a nice profit."

Perhaps this attitude stems from living too closely with their breakeven charts. These charts present a pleasant picture of what will happen when the breakeven point has been passed and beckon insistently to higher volume levels.

But it seems to me that instead of longing for more business, it is more realistic to seek to handle whatever volume is presently available at a profit. If a hard-headed approach is taken to cost reduction, it should be possible to make a profit at volume levels which are much below capacity.

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Practices in Operational Management—Distribution Management[1]

The Marketing Concept

THE past ten years have seen a number of major developments in distribution management, increasingly referred to as marketing management. Certainly one of the most dynamic and basic, which has come to be known as the marketing concept, emphasizes the importance of understanding the market thoroughly. The market is defined as those who buy and use a company's products and services. This marketing concept has been defined as:

A corporate state of mind that insists on the integration of and co-ordination of all of the marketing functions which, in turn, are melded with all other corporate functions, for the basic objective of producing long-range corporate profits.[2]

Thereby the company's total managerial activities are marketing-directed with a greater effort to understand who comprise the market, where the market is located, how much is the market potential, and what are the characteristics of this market which influence its buying behavior.

Marketing Research

This influence of the market on company decisions has increased considerably the amount of marketing research and the application of scientific methods to all marketing activities. This research has to an increasing extent invited the co-operation of the mathematicians and the statisticians as well as the social scientists in the behavioral fields of psychology, sociology, and anthropology—all aiding the market researcher. The past decade has witnessed an increasing extension of research not only to determine the needs of a rapidly changing market but also to determine who are the major influencers and what influences them in buying decisions. Such research has special application to the capital-goods industries in which there are multi-influences in purchasing. Also the rapid technological advances and the engineering developments of the decade have speeded up product obsolescence and have therefore heightened the need for continuously interpreting the market. There has been an increasing extension of research also in such areas, for example, as the development and operation of the sales force; the determination of the amounts of finished-goods inventories, and the location of these inventories or warehouse points; the effectiveness of advertising; and the determination of the selling mix—that is, the relative expenditures for personal selling by salesmen and nonpersonal selling efforts by such means as advertising and sales promotion. Operations research has been applied to some of these problem areas and has begun its contribution in the further application of the scientific approach in solving marketing problems. It has played a role in the impressive invasion by mathematics and statistics as an aid in decision-making in marketing management.

This increased use of mathematics as a tool in marketing management is exemplified in two interesting statements, one by E. H. MacNiece of Permacel, New Brunswick, N. J., as follows:

"Perhaps the most important advance in the past decade has been the development of an integrated dynamic plan for controlling finished goods stock and sales forecasts simultaneously." Another statement by John F. Magee of Arthur D. Little, Inc., reads:

"Since 1950 a great deal of progress has been made in understanding the function of inventories, in developing methods of analysis of inventory functions, problems, and requirements, and in building better control systems. This has been valuable not only in more efficient control of inventories themselves but also in laying the basis for solid studies of integrated distribution systems, including effective use of improved handling, transporting, storing, communicating, and data processing methods. The substantial general interest in this subject in the last year indicates that interest will continue to exist for some years."

New vistas on the subject are opened up in the interesting studies made by Jay W. Forrester of the Massachusetts Institute of Technology.[3]

Product Planning and the Product Line

There are no figures on the total sales volume flowing from new products in the past decade, but individual companies often reported startling figures and there has been a noticeable relation between success in sales and net profits on the one hand and the extent of innovation in products and packaging on the other. Many companies today depend heavily for sales volume on products that were not a part of their line in 1950. While there is a premium on innovation or newness, there also has been an increasing effort to plan a well-balanced product line that fits as far as possible a company's manufacturing and marketing facilities. This balance has helped companies meet the sales slump because of too heavy dependence on one segment of the market. Capital-goods companies more susceptible to changes in business conditions have attempted to invade markets less susceptible to these changes. Other manufacturers have emphasized the importance of a stream of new products to be released when older products lose their sales appeal.

The past several years have seen an increasing recognition of the life cycle of products and the urgent need constantly to change and to plan products that more readily awaken market interest.

Rapid technological advances have made products obsolete at a faster rate, and alert product planning has aided the forward-looking companies to capitalize on this change and thereby enhance their positions in a dynamic market. The importance of product-development activities is well illustrated in one company in which 70 per cent of today's sales are in products created since the close of World War II, whereas the other 30 per cent is in products which the company reports have been improved several times in the same period. Another company reports that 25 per

[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

[2] A. P. Felton, "Making the Marketing Concept Work," *Harvard Business Review*, July-August, 1959.

[3] J. W. Forrester, "Industrial Dynamics, A Major Breakthrough for Decision Makers," *Harvard Business Review*, July-August, 1958.

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cent of its sales in one year recently in the past decade was from products introduced in that year.

A major force in product planning in recent years was the amount spent for product research and development. From less than a billion a year before World War II, spending on research and development increased to an estimated $12,430,000,000 for 1959–1960.[4] Such research has become an integral part of many companies which increasingly teamed together the talents of engineering, marketing, and manufacturing to provide product diversification adapted to the changing market.

There has been a high death rate among new products in the past ten years. However, companies that have well-organized new product development and planning programs with the departments of engineering, production, marketing, and finance all co-ordinating their efforts have suffered fewer new product failures. These programs have increasingly provided for research of the market to learn its current needs in new products, for product testing beyond laboratories among potential buyers, and for testing of the marketing plans. Also important is the fact that the better managed companies have given considerable attention to formulating their product-line objectives and policies. These objectives based on the desired company image have served as a useful guide in adding and deleting products.

Mergers and acquisitions have been stepped up in the past ten years chiefly to add strength to companies' product-line positions.

Channels of Distribution

In the consumer-goods field, the notable developments of the previous decade have been accelerated. The most dramatic have been the continued growth of supermarkets in the food field with emphasis on size and self-service, the emergence of the discount house, and the rapid increase of shopping centers.

Among food retailers it has been estimated that about 12 per cent of the number of companies now do about 70 per cent of the volume. This concentration of strength posed problems for manufacturer suppliers who have increased their sales promotions in the retail stores and their advertising to consumers. Another problem manufacturers have had to face has been the increasing interest of the chains in pushing their own private brands. While the policies on this have varied among retailers, the possibility has posed a threat to manufacturers.

Shopping centers have seen their most rapid increase in number and size and diversity of retail types in the past decade. Those established in this period have been sparked generally by large urban retailers motivated by the change in transportation and in living habits of consumers. Naturally, these centers have drained off some of the sales from the downtown shopping centers. Few and to date not very impressive efforts were made to stimulate downtown shopping.[5]

The discount house, though somewhat changed in character from its original type of outlet with a few items on display and offering few services, had its real growth in the past decade. Its importance was restricted to certain areas where it was a substantial factor chiefly in the sale of household electrical appliances competing with department, hardware, and specialty appliance retailers. In competing with the discount house, the older established retailers have adopted some of the discount-house methods of lower markup, mass display, and fewer services. Interestingly, the discount house has tended to adopt some practices of its old line competitors chiefly in increasing its inventories and in providing some of the services such as delivery and installation.

The wholesalers in foods and hardware, and to a lesser extent in drugs, who have stayed in business have generally aligned themselves with retailer groups as suppliers either to voluntary chains or to selected groups of retailers co-operating with a wholesaler.

In the sale of industrial goods, the wholesale distributor carrying stocks, and the manufacturer's agent and the sales agent without stocks continued as important outlets to a wide variety of firms selling products and as suppliers to firms buying products. There has been some tendency among manufacturers to sell direct to users where the high market potential and the high customer density justified it. While the situation varied among manufacturers and among industries, the middlemen selling industrial goods maintained an important position in the past decade.

Of interest and importance among manufacturers of both consumer and industrial goods in the past decade were the increased efforts directed to improving manufacturer-middlemen relations. The more common efforts were the setting up of middlemen councils or committees to meet with the management, better training of middlemen salesmen, and better planning of selling programs to fit in with middlemen needs.

Among the wholesalers, notable improvements were made in warehouse inventory control, in the more efficient physical handling of items in the warehouse and in deliveries.

Marketing Planning

The development of marketing plans and programs to achieve sales objectives both short and long range was a marked feature of the past decade. Improved market intelligence provided one stimulus for such planning. The annual sales forecast assumed increased importance as a planned effort involving especially the departments of finance, production, and marketing—the latter the most sensitive to the conditions in the market and therefore a major influence in company over-all plans. The year's sales forecast has become the objective for the company's selling efforts and has formed the basis for building a total sales program aimed at a well-identified market. This program co-ordinates both personal selling by salesmen and nonpersonal selling by all other means. Notable studies were made in better determining the more profitable segment of the market at which to direct this effort. Consequently, the task method of allocating the sales expenditures has found favor. While the percentage of sales method is applied, it has been used more as a rough guide to advertising and sales-promotion expenditures. Efforts have been made further to determine both the influencers and the influences in buying as well as the effectiveness of advertising, in order to develop a selling mix best suited to a company's needs. No special advances have been made in evaluating advertising although it continues as an important expenditure in selling.

Long-range planning, especially as far ahead as five years, assumed an increasing role in the past ten years. There are, of course, many companies which still plan in only a rather superficial way for the longer period ahead. However, increasingly companies are developing long-range marketing plans with respect especially to sales volume, to product lines, to channels of distribution, and to management and other personnel needed. With improvement in predictive ability, companies have learned that their long-range marketing plans help them achieve both their short and long-range goals.

Organization for Marketing Management

The greatest organization change in marketing has been in the increased stature of the chief marketing executive's position in many companies. Among the titles used today are vice-president

[4] "Road Maps of Industry," No. 1256, January 22, 1960, by the Conference Board of the National Industrial Conference Board.

[5] The "Directory of Shopping Centers of the United States and Canada," of the National Research Bureau, Chicago, Ill., 1960 edition, contains 350 pages about 2830 shopping centers in operation, under construction, or planned.

for marketing, or manager of marketing, or director of marketing. Under him have been placed generally all the related marketing activities. This contrasts with the earlier situation where the sales manager operating the field sales force was the chief distribution executive. To aid the vice-president for marketing there have been developed organizational structures that generally have included the following: a line executive or field sales manager responsible for producing sales through the field selling organization; staff executives, including an advertising and sales promotion manager who works closely with the field sales manager to aid the latter in producing sales; a marketing research manager to secure the facts about the market and to research all marketing activities so that the planning and operating will be based on the best information available; an administrative services manager responsible for the "housekeeping" within the marketing department; often a product service manager handling the product services such as inspection, repair, installation, especially for mechanical products; possibly also a product planning and development manager, though he often reports to the president; and occasionally a marketing personnel manager responsible for the department's program of securing, training, and developing the marketing personnel.

Paralleling the increase in product diversification in the past decade was the increase in the use of product managers. These product managers were added to many marketing staffs to provide the specialist help needed in developing and selling the diversified product lines through a common field sales force. Where sales volume was not high enough to justify separate sales forces within the company, the product manager thus provided an economical means of securing specialization. While this sharing of the sales force has proved a problem, it has also stimulated more effective planning and co-ordination of the year's sales program.

Greater use of the different staff positions mentioned previously allowed for more specialization throughout the marketing organization and more particularly for increased planning and coordination by the top marketing executive.

An interesting notable development has been an increasing delegation to the field management by headquarters management. This has doubtless also been the case in other major departments of the business. However, it has had special significance in marketing in which a sizable field force operates away from constant association and contact with the headquarters management. Recent years have seen an increasing delegation to the field management who are nearer the place where problems occur and decisions have to be made.

The Sales Force

For many companies the one highest marketing expense is the cost of the sales force. Therefore this cost has been more closely examined and efforts effectively made to increase the salesman's productivity. As in the case of factory and office employees, marketing management too has increasingly accepted its responsibility to improve salesmen's performance. This improved performance has been brought about partially through better selection of salesmen to provide better sales-force material.

However, one of the most interesting developments and one of the most profitable was the improved direction of salesmen, starting with the development of the sales presentation based on a knowledge of buying influencers and influences and then better and more organized coverage of company customers in line with their purchasing potentials. There has been increased recognition that the salesmen need better direction, especially more help in analyzing their prospects' needs and in presenting the company's products and services with emphasis on the product's performance for the customer. Here again, marketing research has often provided the intelligence for building the training program and for targeting selling efforts in a profitable manner.

The development of more meaningful standards chiefly as to sales volume and expenses has helped control salesmen costs. To aid in improving salesmen performance, there has been in the past ten years an increased use of periodic appraisals of salesmen often called the performance review.

Management Controls in Marketing

Because of increased marketing costs in the past decade, there was a keener interest in and an extension of management controls in marketing. The increased use of short and long-range planning provided more suitable bases for such control. The swing away from an interest in volume sales only continued to emphasize selling at a profit. More recognition was given to the unprofitable sale. This battle against the threat to profits began to see the increased use of automated machines to speed inventory and product-flow data from the field to headquarters management.

Both improved machines and better systems aided this profit-directed marketing effort by providing more refined current information in four important cost-control areas: by products and product lines, thereby squeezing out the less profitable items; by customers, thereby focusing attention on the more profitable potential buyers; by order, thereby increasing the order size and improving the efficiency in order handling, both clerical and physical; and by units of the sales operation—by regions, districts, branches, and salesmen—thereby increasing the gross margins contributed by each. Thus the total marketing effort has been more profit oriented in the past decade. It has achieved the point of view of top management that sees the total picture rather than a departmental activity. This marketing concept has helped the more progressive companies to strengthen their positions in our dynamic and increasingly competitive economy.

DISCUSSION

A. Hugh Forster[6]

Professor Hawkinson's review of marketing practices in the past decade clearly demonstrates management's continued responsible concern with more precise control over the various aspects of business. Even when some areas are not subject to control—such as customer preferences which, despite recent comments to the contrary, marketing management can only hope to influence—management has recognized the need to try to forecast and act on these changes and trends. While there have been notable and widely publicized examples of some managements' apparent failure to recognize these trends in certain industries, the rapid transition of many of these companies to producing wanted types of goods indicates close cognizance of changing needs and tastes. The performance of the major automobile manufacturers with regard to the compact car would make an excellent case study.

A thought I would like to add to Professor Hawkinson's review is the apparently changed attitude of marketing management to pricing in the development and distribution of products. Price seems to be moving from the prime consideration to a secondary role. Consumers are generally willing to pay for the item they want, even though cheaper items which would do a similar job are available. While greater discretionary income no doubt makes this exercise of preference possible, I think it only fair to credit farsighted managements which have been willing to develop the kind of products people really want because their forecasts indicated these products could be sold. We have good examples of this in many of our own firm's businesses, especially in the

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flooring field where consumers have been willing to pay double the price of traditional floorings for the new, more colorful, and easier to maintain vinyl materials.

As one engaged in the advertising and public relations field, I am also conscious of another aspect of managements' attempt at more scientific control of marketing responsibilities. Criticisms are already being heard that such things as marketing research, large-scale advertising, mass distribution, and even new product development are somehow antisocial—that these are attempts by a handful of management people to destroy individuality in our society. Members of ASME should be able to recognize these criticisms as today's parallels of yesterday's criticisms of mass production and scientific production management. They are also similar to today's reactionary opposition to automation. With a growing population and economy, scientific solutions are as essential to marketing problems as they are to problems which have been traditionally regarded as "technical." There is certainly much room for criticism in the way individual managements may execute specific programs in the areas of market research, advertising, mass distribution, new product development—and even automation—but blanket indictments of these modern scientific techniques can only cause a loss to the society these things can benefit.

Author's Closure

Mr. Forster has effectively pointed up certain important aspects of Marketing in the past few years. Certainly, the research to better understand the market and the trends of market preferences, needs emphasis. However, it should be indicated that such research applies also to industrial goods—a fact which is often overlooked. The comment on price as an influence in buying is a noteworthy addition. For some products, price doubtless plays a secondary role; it is difficult fully to evaluate the different influences in buying, but the keen competition of the last few years suggests that prices still play a very important role in the purchase of many products. Mr. Forster has made an excellent addition by his effective statement of the usefulness of distribution activities in our economy.

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Practices in Operational Management—The Federal Government[1]

THERE may have been a time when inefficiency of the Federal Government could be considered a comfortable luxury of a burgeoning self-reliant nation. Some would deny that such a condition ever existed; there would be no disagreement that, in any case, it is no more. It is too apparent that the nation's survival—and in fact, the physical continuance of its individual citizens—may well depend upon the wisdom of government programs and the effectiveness with which they are carried out. In the intricate economy and international requirements of the Sixties our national role may be vitally affected by such elements as the proper fostering of creativity of the human mind and continuous, unmatched growth in his productivity quite as well as by the maintenance of competitive superiority in the arts and hardware of defense.

And the pace of such matters is steadily increasing—change and innovation take place at an exponential rate. The headlines of today were the images of a few dreamers as the decade of the Fifties began. Now in the span of two days—August 11-12, 1960—an instrument loaded capsule was for the first time retrieved from space; the first Echo satellite, precurser of a new epoch in world-wide communication, was put into orbit; and man flew the X-15 26 miles aloft to the fringe of space at 2000 mph. The successful testing of a new guidance system for intercontinental ballistics missiles and of another Polaris missile scarcely received press notice. At the beginning of the century two bicycle manufacturing brothers could build the machine and make the first airplane flight. The role of the individual creative mind is at least as great today but many of the giant strides in world progress now require the massive participation and support of government. Even the giant corporations do not have the wherewithal or their officers do not feel justified in underwriting the risks and expense. As a result of integrated application of private and public resources the Administrator of the National Aeronautics and Space Administration can now report: "Our experiments, failures as well as successes, have clearly demonstrated that space is accessible to man." The purpose of a currently programmed NASA project is to enable man to move about freely in space!

Important as is the exploration of space and Earth's companions, discoveries in programs sponsored, for example, by the National Institutes of Health for saving lives and by the Department of Agriculture for expanding the wherewithal to live, have as great import for the world community and for the position of the United States and its approach to the fruition of man's potentialities in that community. All of this on the assumption that the deterrent effects of Defense programs, the inventiveness and sagacity of the Department of State, the related contributions of other agencies, and the intellectual, moral, and material might of a purposeful nation continue to provide a future.

In addition to this concern which American citizens must have in the effectiveness of their government is the sheer economic impact of the programs which are established in basic response to public demand. A federal budget in the neighborhood of $80 billion means that one dollar of each six or seven of GNP goes through this channel. Real and personal property of the Federal Government totals some $265 billion, almost as much as the national debt. Nearly 5 million persons are on civilian and military payrolls of the Federal Government and an estimated 4 million in addition are employed on Defense contracts alone. The indirect influence on the remainder of the nation's activity in terms of both the impact of economic forces of this size and in the effects on public policy is pervasive even if not susceptible to precise measurement. The citizen has a right and a duty to demand good management—as he has a corresponding obligation to contribute his part in seeing to its accomplishment. And as Frederick Taylor once commented in regard to applying Scientific Management to government: "You can't introduce economical methods by sitting up and howling." It takes perception, painstaking effort, and broad, active, and positive support.

A Decade of Partnership in Management

Somewhere in government there appears to exist in use every substantial applicable management idea which has current status. The basic problem is to effect the proper selection and widespread employment of these ideas and to have a full participation in the development of new ones. This was true in 1950 as well as 1960. Basic differences which took place during the decade are the widespread acceptance of the idea that managerial principles have universality (the common idea before 1950 that government is different has substantially given way to the positive belief that differences primarily require intelligent adaptation) and the striking advances which have been made in government in a number of the areas of management.

In some cases it has been largely a matter of catching up with industry. In some, government has been the pioneer. And in many areas, advance has come through free interchange of ideas and experimentation between business, education, and government—a pattern of partnership which grew in strength through the decade and promises to increase to mutual advantage.

Industrial Engineering

A striking illustration in the area of "catching up" is the sophisticated application of industrial experience in work measurement, engineered standards, and plant layout. Here government got a late start. A substantial handicap was a legislative prohibition against the conduct of time studies which was included in Army and Navy Appropriation Acts in 1915, added to others subsequently, and not completely removed until 1949. (The removal itself was an interesting case of collaborative effort. It was effected following a concerted campaign and testimony of a group of industrial engineers who served in the government during World War II and upon return to industry decided to make this continuing contribution to better management.)

At first there was reluctance to take advantage of the new

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[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

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freedom to develop and apply meaningful standards in the substantial areas where government activity is especially similar to that of industry—such as the developmental and pilot-run, job-shop operations of arsenals and ordnance plants, and the overhaul and modification of aircraft and ships. It was recognized that if industry found the use of standards essential to internal operations in a competitive economy the need was even greater in the more insulated environment of government operations of this type. However, a legacy of uncertainty remained after abolition of the restriction. Accordingly, the Fifties saw an increasing interest in and application of standards and other aspects of industrial engineering. Much of this took place in the favorable climate created by the corporate-like industrial fund (also essentially a program of the Fifties). However, there were substantial applications outside the use of this fund, for example in aircraft overhaul.

Results were similar to industrial experience. Improvements in costs and labor efficiency in the order of 20 per cent became common in government application as they have been historically in business. By 1960 some areas had been essentially covered, e.g., arsenals of the Army's Chemical Corps, a major program was in effect in the Air Force's aircraft overhaul operations, and under way in the Navy's ordnance plants and shipyards.

International Exchange of Technical Know-How

An organized program of sharing technical knowledge, began as part of the European recovery program in the late Forties, became global in application under the imaginatively conceived and unimaginatively named "Point IV" program. The importance of this type of effort in expanding world well-being under conditions of freedom was sensed but perhaps not really understood in the United States until recent economic studies showed that technological advance has been the primary force back of some 90 per cent of the increases in our output in recent decades. The full impact upon public policy is yet to be appreciated.

Again this program has been a shared one—extensive efforts being sponsored by the Federal Government, the United Nations, professional associations, and private enterprise.

Automatic Data Processing

The exploding use of ADP was another prominent phenomenon of the Fifties. There were only a half dozen or so internally programmed computers in 1950. The first commercially produced large scale computer was installed in the Census Bureau in 1951. Early development was sponsored principally by government and during most of the Fifties government use predominated, probably being surpassed by nongovernmental applications late in the decade. The largest single agency use, government or private, is by the Department of Defense. In all, there are approximately 700 computers now operating in the government for business management, science, and engineering purposes, plus applications in the areas of military operations and intelligence. The numbers and variety are so great that the development of a common programming language has become necessary—which incidentally is being led by the Department of Defense as the principal objective user and with full co-operation of manufacturers and major business users of equipment. So new is the application of computers, however, that only 15 or 20 per cent have been in operation a sufficient length of time to provide valid bases for assessment of results.

The tremendous speeds made possible by electronic means have opened whole ranges of possibilities in scientific and engineering calculation not before feasible. Business-type applications began through capitalization on this characteristic of speed plus accuracy in doing old things faster—payrolls, personnel data, stock records and inventory management, cost and appropriation accounting, and the like. The costs of doing these things with computers are frequently underestimated but the increases in speed and accuracy are striking, including, for example, related personnel and supply actions. But the potentialities are now being recognized as more fundamental. Big machines, if legitimately kept busy, are more economical per unit of output. This provides additional pressure toward the integration of all relevant data for use by supervisors and executives, leaping across organizational lines within and even between agencies; raises questions as to centralization versus decentralization, including even the possibilities of decentralizing certain decision-making within rules, in effect to the machines; and indicates possibilities of pooled use. Programs are under way looking toward the training not only of technicians but of top-level officials in the managerial potentials of ADP. As one government official has expressed it: "It is not hardware that gets the job done; it is systems—conceived in breadth and developed with clear objectives in mind."

Operations Research

While the precise origins of Operations Research are obscure, the first OR teams, and substantial conscious use of related techniques, appeared in connection with solution of problems of military logistics and operations in World War II. Development and widespread application of linear programming, gaming theory, queuing, sampling, and probability, used individually or in an integrated fashion in government and business management is largely a product of the Fifties. In part, this has paralleled the development of ADP, which is so useful in applying many of the mathematical operations involved.

While the immediate impetus thus came largely from government, which has even established separate OR organizations for its use, the fuller development of the techniques and applications has resulted from co-operative efforts of government, business, professional societies, and education. Through this means, significant advances have been made in enabling management to base its decisions on scientifically determined facts, and including application to cases where many variables are involved beyond the capabilities of direct mental manipulation.

Management of Research and Development

A recent survey sponsored by the National Science Foundation indicates that some three fifths of the many billions of dollars being spent on research and development is being paid by the Federal Government. R&D has thus become a major element of national endeavor with government as the chief supporter. The last decade has seen a sharp increase in the attention being given to the management of such programs. In large part this has meant simply more effective application of techniques and approaches previously in use, perhaps in an improved and broader context of public purpose.

Probably the most striking new element in this area has been the demonstration that invention—if not discovery—can be scheduled and, through the informed manipulation of resources, controlled. Prominent illustrations are in the missile area, where such procedures have become standard practice, extending into major sectors of the business economy. For example, in the Polaris program much of the management system is applied by the many contractors involved. And so many R&D administrators in business and government have been interested in learning more about the techniques involved that presentations have been repeatedly scheduled. In this sophisticated system not only are the principal key events scheduled and related to each other, but through use of a computer frequent calculations identify the longest chains among the vast number of related

events so as to enable management to concentrate its attention on the pay-off areas in terms of reducing lead time. The demonstration that the inventive application of scientific fact can be scheduled and controlled has, of course, significant implications beyond military hardware and even the traditional scope of R&D.

Organization

While substantial changes in organization took place during the decade they were mostly structural improvements or organizational adjustments in recognition of current requirements or of changed circumstances. There was no fundamental change in the largest single organization problem—how to make the President's job manageable. The decade began and ended with his being expected to exercise an impossibly wide span of control. The President's Committee on Administrative Management in 1937 was brash enough to recommend that all of the various agencies reporting to the President be consolidated into 12 major departments. This recommendation was not effected and the two Hoover Commissions eschewed such sweeping specificness. The governmental structure at the very top, therefore, remains an unsolved problem. The question may even be raised as to whether there is not a United States attitude comparable to that of the French which made so many governments vulnerable—an apparent basic disinclination to enable the President to manage. Nevertheless, there were significant organizational changes during the decade and at least they constituted limited responses to limited situations.

Of general import was the work of the two Hoover Commissions on Organization of the Executive Branch of the Government. The first Commission was established in 1947 but its reports were made in 1949 and implementation was to a substantial extent effected in the Fifties. The second Commission was established in 1953 and its reports made in 1955. The Citizen's Committee on the Hoover Report—itself a significant innovation for effecting follow-through—kept a box score and estimated that 72 per cent of the recommendations of the first Commission were adopted. A White House adviser estimates that some 77 per cent of the recommendations of the second Commission were accepted in whole or in part by the Administration. Of these, 76 per cent have been or are being implemented by the Executive Branch and a number of others await Congressional action. It may be relevant to note that the scope of the two Commissions differed in one respect: The first was barred from considering whether or not a particular function should be carried on by government; it was to look to the efficient and effective discharge of existing functions. The second was charged with examining the propriety of functions as well. This occupied a substantial portion of the attention of the second Commission and gave rise to many controversial recommendations.

The Korean War had a somewhat different impact upon organization than did World War II. In part, this was doubtless due to its more limited nature but in addition a different approach was evident. The governmental agencies of World War II were largely created for the emergency; for Korea, prime dependence was placed upon existing agencies. A National Security Resources Board had been established as a permanent agency in 1947. In 1950 the powers of the Board were concentrated in the Chairman and it was subsequently reconstituted as the Office of Defense Mobilization. This served as a general co-ordinating agency for the Korean effort. It continues, in combination with Civil Defense, as the Office of Civil and Defense Mobilization. The few agencies which were created to cope with certain aspects of the Korean crisis included the Defense Materials Procurement Agency (later transferred to the General Services Administration), the Defense Production Administration (consolidated with ODM), the Defense Transport Administration (terminated in 1955), and the Economic Stabilization Agency (terminated in 1953). The Federal Civil Defense Administration was also established during the Korean crisis in recognition of the possibility of more general conflict. In view of the continuance of that possibility, it has been kept in existence in consolidation with ODM, as noted.

A comparison of top structure of the Federal Government, 1950 and 1960, shows the following principal changes: The Economic Corporation Administration, by way of the Mutual Security Agency and the Foreign Operations Administration, has been incorporated into the Department of State as the International Cooperation Administration. The Federal Security Agency has been granted Cabinet status as the Department of Health, Education, and Welfare. The National Advisory Committee for Aeronautics has been combined with new space functions into the National Aeronautics and Space Administration, with emphasis upon space. The Reconstruction Finance Corporation has been terminated. Several continuing programs have been consolidated or emphases modified in such agencies as the Farm Credit Administration, the Federal Home Loan Bank Board, the Federal Aviation Agency, and the Office of Civil and Defense Mobilization. New organizations are represented by the National Science Foundation, the Small Business Administration, and the United States Information Agency, each of which has roots of some age. Basically, therefore, in terms of major agencies of government the pattern of 1950 is still that of 1960. Adjustments, modifications, recognition of new factors have taken place, but the essential structure remains.

To assist in the co-ordinated operation of this complex system, the President has enlarged his immediate staff. Apparently, there has been substantial borrowing from a familiar military pattern in the provision of staff aids and the exercise of staff work prior to the presentation of matters for approval or decision. There may be inadequate recognition that the Presidential situation differs in important ways from that of the commanding officer of a military operation. In war there is seldom uncertainty as to the identity of the enemy and the military objectives to be achieved. Points at issue involve tactics or strategy to be employed and resources to be allocated, and the principles involved come from a common tradition Government management involves analogous issues but the objectives are less sharply defined and even the identity of the "enemy" may be obscure. A result is that probably less reliance can be placed upon identity of interest or point of view of the persons or officials involved, and therefore the President may need personally to consider a wider range of problems and fewer prepared solutions than obtain in a military situation. Staff work can be overdone.

There have been some significant advances in internal organization at the Departmental level. The biggest management job after that of the President is that of the Department of Defense. Here, organizational movement has been in the direction of integrated operation. The National Military Establishment began in 1947 as a sort of loose confederation of three military departments, each of which enjoyed Cabinet status. This was modified in 1949 by restricting Cabinet rank to the newly named Department of Defense and in otherwise strengthening the role of the Secretary. Further strengthening was effected in 1953 and 1958 through the abolition of statutory boards for Research and Development and for logistics and the clear lodging of power over these and other functions in the Secretary. The chain of command for the operational direction of unified combatant forces was simplified, the role of Chairman of the Joint Chiefs of Staff enlarged, and the Secretary given additional assistant secretaries and a Director of Research and Engineering to help

him in the unified direction of the operations of the Department. Defense organization continues to be a popular subject of discussion. Many individuals and organizations, public and private, have made studies of this and recommendations for further change.

In the Post Office there was a surge of effort to apply modern concepts to the management and procedures of that department. Other sectors had similar programs. Also, beginning with Defense and extending to other departments, there was increased attention to what has been called the comptroller concept, a strengthening of over-all management through modern fiscal organization and procedures. This may be considered part of the continuing extension of the management purpose back of the creation of nonpolitical Administrative Assistant Secretaries in the Forties.

Modified organizational forms for conducting governmental operations also came into increased use. In the search for acceptable means of achieving both administrative flexibility and responsibility, the government corporations had enjoyed substantial favor in the 1930's. In the Fifties their use was on a relatively stable plateau. However, an alternative—contracting with private concerns to carry out government functions—had been steadily growing in favor and was widely used during World War II. The second Hoover Commission gave substantial endorsement to this procedure in its attempts to get the government out of direct operation of business-type enterprises.

The extent of contracting may be indicated indirectly. All research and development in this country is heavily supported by the Federal Government. Two thirds of personnel research is financed by the Government but only one third of this is performed directly. In some cases the managerial direction of the development of whole weapons system, e.g., ICBM's, is effected largely through a contractor. Earlier in our history much of the implements of war were produced in government arsenals. Now all aircraft and most missiles and naval vessels are produced by industry. Procurement by the Defense Department totals some $25 billion each year. Another broader indication of the extent to which governmental activities are performed by business and industry is that total Federal expenditures almost doubled in constant dollars from 1949 to 1959 but the total personnel of government, civilian and military, increased by only one third. In other words, Federal payments increased three times as fast as government personnel, indicating enlarged use of private facilities for translation of government programs into action.

This may well be effective use of specialization and division of labor and a proper means of achieving flexibility with responsibility. However, by the end of the decade the contracting practice had become so prominent that there was substantial inquiry from the Congress and others as to whether it had been carried too far and whether in fact the government was in effect paying a fee to avoid self-imposed restrictions.

Another modification of the corporate approach but within the departmental structure was the use by the Department of Defense of a quasi-corporate system of revolving funds as vehicles for the institution of comprehensive systems of modern management, borrowing extensively from business experience.

On another plane, there was the addition to the Union of the 49th and 50th States, together with the organizational changes which accompany the achievement of this status in the administration of governmental affairs in Alaska and Hawaii.

International Organization

Recent years have seen a continuing and expanding use of previously established international organizations with some innovations in the creation of new ones. At the regional level NATO has continued to be a prime agency for co-ordinated defense effort within the Atlantic Community. New organizations, less institutionalized, were created with United States co-operation in other regions, e.g., in South East Asia and in the Middle East. Joint economic programs have been continued through such associations as the Organization for European Economic Co-operation (negotiations are now being conducted looking toward enlargement of geographical scope and full United States membership under the new name of Organization for Economic Co-operation and Development) and the United Nations. Bilateral programs are also being continued, including those involving education in management.

The first combined UN military force, in Korea, was organized under United States leadership and this government was a prime mover in getting the UN police contingents organized and deployed on the Israel-Egyptian frontier and in the Congo.

There appears to be a tendency to make increasing use of multilateral organizations, particularly within the framework of the UN. This presents difficulties of organization and co-ordination but at the same time may well multiply United States effectiveness.

Supply and Logistics

The nation's biggest "distribution" and maintenance job is clearly the supply and logistics program of the Department of Defense. Involved is an inventory of some 3 million items costing $45 billion. This inventory supports major equipment such as tanks, ships, missiles, and aircraft (costing another $70 billion), constitutes food and clothing supply for military personnel, and provides the material for a wide variety of support functions necessary to maintaining military capability. New annual procurement to replenish inventories, obtain and maintain weapons, machinery, and the like, and provide research and development for improvements totals about $25 billion.

In recent years there has been an accelerating effort to improve and modernize the management of this huge program while maintaining effective readiness to support hostile operations should they become necessary. A few examples are especially worthy of note.

A "single manager" system has been established whereby items common to more than one Service are assigned for management at the procurement and wholesale distribution levels to a single organization which provides service to all. Well established operations cover the supply areas of subsistence, medical supplies, clothing and textiles, and in part petroleum. Transportation single managers have been established for sea and air transport and for traffic operations. Four recent supply additions are general, industrial, construction, and automotive supplies. This approach accomplishes many of the objectives of the proponents of a separate "fourth" service of supply while avoiding the disruption of a transition and making effective utilization of existing organization and facilities.

Through improved inventory management and buying practices, on hand inventories have been reduced approximately $10 billion in the past three years. This reduction alone is some 15 times the total inventory of, say, Sears Roebuck. Comprehensive policies and systems have been developed to help assure that equipment and supplies available anywhere in Defense are transferred and used before new procurement is effected. Further improvements are under way, including the consolidation of scattered surplus sales offices and the institution of a training program to improve their effectiveness. Even at an optimum inventory level, surplus disposal will be substantial due to the need for continual modernization of weaponry and associated equipment and the consequent obsolescing of current material.

Procurement practices continue to be improved. New cost principles have been promulgated and utilization of the most current, complete, and accurate cost data is required. Military departments are increasingly active in contractor "make-or-buy" decisions and in review of subcontracting systems to assure appropriate competition and use of small business. Improved accounting controls have permitted simplification of contractor record keeping.

A recent action which has elicited substantial favorable comment has been the establishment of the Defense Communications Agency for operational control and supervision of the worldwide communication systems of the military departments, including the establishment of a single "long-lines" system analogous to that of AT&T.

Progress was also evident in areas outside the Department of Defense and applicable to the government as a whole. The chief civilian "logistics" agency is the General Services Administration. This was established by consolidation of several agencies in 1949. Its program was enlarged during the Fifties and its pattern of operation improved. An illustration of progress effected is the development of the aspect of scientific inventory management designated as EOQ (for economic order quantity). This is a technique, based on collaborative work with a major manufacturer of electrical equipment, whereby inventory costs are minimized through balancing procurement and carrying costs in order to arrive at optimum amounts and frequencies of ordering. It is being widely applied. Other illustrations are the establishment of interagency motor pools for local transportation in cities where several agencies have offices, review of the appropriateness of land holdings associated with Veterans' hospitals, and the like.

Financial Management

Government was a pioneer in 1921 in establishing a budget system for purposes of planning and controlling programs to be managed. However, the managerial potentialities of such an approach were not exploited fully in government; too great a preoccupation with fiduciary responsibility persisted, undoubtedly augmented by a corresponding preoccupation of the General Accounting Office with detailed transaction auditing and long delayed but assured disallowances of questionable actions. The 1950's witnessed a great surge of change, of catching up with developments which had taken place outside of government, and a recreation of the pioneering spirit in some sectors.

The Budget and Accounting Act of 1950 contributed to this initial reorientation as did the first Hoover Commission. A major recommendation of that Commission was to establish budgeting on a program or "performance" basis instead of the outmoded functional pattern of "object classification." Thus the projected costs of programs would be brought together rather than scattered in many places and the relationship between cost and results lost. This was substantially accomplished.

The second Hoover Commission recommended further change to a cost budget, which is intended to show resources to be applied to programs including such aspects as draw-downs of inventory as well as current appropriations. They also believed that emphasis should be placed on expenditures rather than obligations. The cost basis of budgeting is well on the way of accomplishment and substantial attention has been paid to expenditure levels. However, the obligation aspect of budgeting is still recognized as essential to effective program control, especially in areas involving long lead times.

The use of flexible budgeting as a means for controlling overhead or indirect expense is largely associated with the application of the quasi-corporate system of industrial funding in Defense although it may well be extended beyond this.

From a comprehensive management point of view, a most interesting development has been the extensive application of revolving funds in the Department of Defense. These were authorized by the 1949 amendments to the National Security Act and their growth since then has been very substantial.

The Navy Department had made a beginning in the use of the stock fund, a relatively simple revolving fund used for the financing and control of inventories. During the 1950's this was extended to the other military departments and enlarged in Navy. Inventories now under this type of control in Defense total some $8.4 billion. Under the incentives of stock fund control and through associated improvements in inventory management substantial draw-downs of inventories have been effected. As a corollary, excess cash has been generated. Approximately $5 billion of such excess have been returned to the Treasury or reprogrammed by the Congress for other purposes. This constitutes very substantial and persuasive evidence of the efficacy of this technique in encouraging better management.

The industrial fund is more comprehensive in coverage and includes most controllable costs involved at installations to which it is applied. These are usually of a business-like character, such as arsenals, shipyards, ordnance plants, sea and air transportation agencies, research and development establishments, printing plants, and the like. The industrial fund partakes of many of the characteristics of a government corporation. As such it has been used by its developers and promoters as a vehicle to get established a modern comprehensive system of management. In this there have been some striking successes, which have elicited the commendation of leading business consultants and gained favorable comparison with the best patterns in private industry. Such progress has not been uniform, however, and there is a current program to extend the best proved patterns to the remaining installations.

Modern accrual accounting is a standard feature of industrial funding. Its value to effective management is so clear, however, that extensive efforts are being applied to extend this practice to government generally. Such a procedure is handicapped somewhat by traditional appropriation accounting but substantial progress is being made. It is strongly supported by the Bureau of the Budget, the Department of the Treasury, and the General Accounting Office as part of their comprehensive joint program for the improvement of financial management in the Federal Government.

The widespread application of financial property accounting is another facet of the recent transformation of financial practices. The only way in which a manager can grasp the magnitudes of large aggregations of varied property and relate them is to apply some common denominator. The dollar serves as the most useful of such measures. For the tremendous holdings of the Department of Defense the stock fund made a significant contribution to bringing this about. The technique, however, was extended far beyond the stock fund coverage of "common-use" items and is now well established as a general management tool, although use has not as yet achieved full sophistication.

The first general inventory of real and personal property of the Federal Government was compiled as of June 30, 1955. This has been reported on an annual basis since then. While initial measures were somewhat crude and even yet do not reflect adequately current value as well as original cost, improvements are steadily being made. In any case, for the first time the citizens of the United States have a general measure of their shared public holdings. The last such inventory indicates a total of some $265 billion.

The changed approach to financial management has applied also to audit. Previously for general government the General Accounting Office had emphasized transaction auditing, the minute item-by-item examination of original records to assure

that every penny had been spent legally if not economically. Records were even shipped to central locations for examination. The process was long and involved, results were not known until years after the transactions had taken place, and meanwhile the possibility of disapproval hung over the responsible officers. Naturally the effect was a pervasive attitude of "play it safe."

Prior to 1950 the GAO had been required, somewhat to its reluctance, to perform a business-type audit of government corporations. This involved on-site examinations of records on a sampling basis, essentially to test the validity of the system in use rather than to certify to each transaction. As industrial funding was applied in Defense this method was also extended to affected installations. Then it was decided that as the changes could be effected the on-site, sampling approach would be applied generally. At the same time the nature of the audit was to encompass efficiency as well as legality. The result is a much greater emphasis upon system validity and managerial effectiveness, a shift away from the often picayune toward the significant. Of course, complete transformation does not take place, immediately or perhaps ever. But from the viewpoint of managers and engineers the trend is very encouraging.

Corresponding to this change in GAO approach has been the establishment of systems and organizations within agencies to conduct internal audits. These are oriented also in the direction of management usefulness and practical testing of the adequacy of the financial systems. The growing effectiveness of internal audit has, of course, contributed to the general adoption by the GAO of its sampling, commercial-type approach.

Human Factors

The human aspects of government management continue to command substantial attention. One indication of this interest is in the degree of support given to advancing the fund of knowledge and understanding of the subject. A recent comprehensive survey of personnel research programs indicates that the Federal Government underwrites some two thirds of the total, with foundations and business sharing most of the remainder. The findings in terms of motivation, group behavior, leadership, and the like are of direct interest to government but also have applicability to the conduct of organized effort generally.

One program aspect which has gained prominence in recent years is that of executive training. Government programs for technical training are of long duration, and the military departments have engaged in advanced in-service training of officers, including senior levels, for some time. Recently there has been implementation of the long felt need for a more general program for upper echelon government executives. In part this is due to a still developing realization that management is itself a subject which can be taught. Many executives who have gained their positions through promotion have excellent technical background but have not been exposed in a systematic perceptive manner to basic aspects of management and the environment in which it must operate. Executive training programs are designed to fill that gap.

A prominent recently established program is that of conferences for career executives in the upper grades, organized and conducted by the Brookings Institution with initial support from the Ford Foundation, and with full co-operation of the Civil Service Commission and government departments and agencies. A major purpose of this series is: "To offer these officials a broader view and better understanding of the responsibilities and duties of federal executives and to encourage the development of attitudes and skills that will enable individuals to fulfill the obligations of those positions more effectively." The general approach is gaining enlarged acceptance, interest, and sponsorship.

Another major area of attention has been the matter of pay of government employees. Adjustments in schedules have been made from time to time but, despite extensive discussion, there has been little change in fundamental structure during the last decade. In such terms the chief issue of principle has been that of reasonable comparability of Federal salaries with those which obtain in the economy generally. The principle is well established for blue collar employees. A major recommendation of the first Hoover Commission was for further but limited extension: the second Commission also called attention to this principle.

Several committees have studied this problem in recent years: The Defense Advisory Committee on Professional and Technical Compensation (Cordiner Committee), the President's Committee on Scientists and Engineers (Young Committee), and the Interdepartmental Committee on Civilian Compensation (O'Connell Committee). The uniform conclusion has been that there are substantial discrepancies between Federal and general pay scales which seriously handicap the government in obtaining and keeping the talent necessary to manage and conduct its functions. The Bureau of Labor Statistics is currently completing a first edition of a periodic comprehensive study on white collar job rates, which will provide a factual basis for determining the precise extent of current discrepancies.

The absurdity of the argument that the government cannot achieve reasonable comparability for most grades is especially apparent in the experience with blue collar employees and in the wide practice of contracting for the conduct of government functions, in which the contractor pays the going rates and is reimbursed. There is growing recognition that the undoubted attractions of Federal employment, to the extent that they are not equally present in private enterprise, are largely counterbalanced by the peculiar harassments and other disadvantages which exist and that the government employee and his family should not be penalized for his choice of public service.

Some steps in the direction of comparability have been taken through legislation concerning scientists, engineers, doctors, dentists, and nurses, but the principle has not been applied generally. As of the close of the decade the official position of the Administration is: "Fixing Federal salary rates on the principle of reasonable comparability with private enterprise rates for similar positions is long overdue." The decade thus began and ended with proposals to extend the principle of reasonable comparability. Whether there was real progress in establishing acceptance of this basic management position will be determined by action in the Sixties.

Conclusion

The decade 1950–1960 experienced no overriding crisis such as the depression of the Thirties and World War II in the Forties. Those gave rise to drastic managerial changes, the creation of new structures, extensive experimentation in ways of managing rapidly changing situations. From a management viewpoint the Fifties were a period of exploding knowledge and techniques of problem solving; of marked turning to the scientific and engineering world for assistance in achieving new break-throughs in the field of management; of advance at varying rates along a number of fronts, interspersed with striking innovations in some areas.

In the years immediately ahead there will be at least continuation of past achievement. And the basis of experience, knowledge, ideas, identified problems, and broad public-private collaboration has been provided for a new creative surge of progress in government management.

DISCUSSION

Mary Cushing Niles[2]

Howard K. Hyde has compressed into this paper a masterful and comprehensive survey and evaluation of whole reaches of management, each of which might well have been the subject of an individual paper. This he has done without superficiality, presenting his material with scope, depth, and happy choice of detail. Emphasizing the economic impact of Federal operations, he notes that more than nine million people are employed directly and indirectly on Federal civilian and military work and one dollar of each six or seven of GNP is channeled through the Federal Government.

This discusser particularly commends Mr. Hyde's introduction and conclusion. "The 1950's," he says, "were a period of exploding knowledge and techniques of problem solving; of marked turning to the scientific and engineering world for assistance in achieving new break-throughs in the field of management; of advance . . . interspersed with striking innovations." The survival of the nation may well "depend on the wisdom of government programs and the effectiveness with which they are carried out . . . . Our national role may be vitally affected by such elements as the proper fostering of creativity of the human mind and continuous, unmatched growth in his productivity."

Mr. Hyde gives a birds'-eye view of applications of existent and new techniques in Federal operations, such as the greatly enhanced use of industrial engineering; systems for supply and logistics; ingenious adaption of revolving funds, stock funds, and industrial funds within government; tremendous progress in making budgets into more realistic instruments for programming and for control; improvement of tools and methods for financial management; and executive development for career civil servants.

Mr. Hyde rightly points out that many of the greatest innovations and extensions in the field of management have come from partnership of government, business, and education. He states, but understates, the contributions of the Federal Government to the innovations and inventions characteristic of management progress—automatic data processing, operations reasearch, management of research and development, and basic research into human behavior and leadership—as well as to the "demonstration that invention—if not discovery—can be scheduled and, through the informed manipulation of resources, controlled."

In this discussion some topics treated only sketchily by Mr. Hyde are carried further. These fall primarily in the fields of international organization and economic and social development; human relations; and the relations between the political and civil service functions of government.

The *worldwide reach of Federal operations is noted,* from defense, to exploration of space, to scientific and technical contributions to world health and food supply. Even the effort to improve budgeting and accounting has assumed a worldwide aspect. Mr. Hyde cites the great strides taken from the old budget by "objects" (personnel, supplies, etc.) to "performance" (what is necessary to obtain a result of given dimensions), and then to "accrual" budget which shows how much has been allocated to a purpose, how much used, and how much is still needed to complete the requirement. The Foreign Relations Committee of the Senate has been pointing out for several years the great need for some means for longer range planning of foreign aid without giving up the traditional protection of annual appropriations by the Congress.

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Mr. Hyde identifies briefly two major areas of *inventiveness,* the *interchange of technical know-how* and related programs of *international organization.* The high degree of co-operation and co-ordination among different organizations in economic development and mutual defense has been unprecedented in time of relative peace. Management problems of no mean proportions are involved. Ingenious devices undertaken for the Marshall Plan near the end of the Forties have since been applied to all other areas of the world, with striking results, as Mr. Hyde says, in economic productivity and greater health. He does not mention the remarkable *exchange and diffusion of management principles and techniques.* One management innovation, now commonplace, is the arrangement by the United States and another government for an American university to undertake a sister program in the second country. Government to government loans and grants have increasingly been superseded by arrangements for participation of private organizations. The facilities of the United States government, the United Nations agencies, other governments, and a variety of private agencies and multilateral public agencies may be involved. A recent example is the Indus River agreement, involving the Governments of India, Pakistan, Australia, Canada, New Zealand, German Federal Republic, the United Kingdom, the World Bank, the US Development Loan Fund, and other instrumentalities.

Mr. Hyde devotes a paragraph to the *human factors of administration* and mentions government support of research in motivation, group behavior, and leadership. He does not emphasize, although he would no doubt agree, that the social sciences are profoundly affecting management. In the tremendous impact of science on our whole civilization, the physical and engineering sciences had first effect. The social sciences are now adding virtually a new dimension.

It is an anomaly that government money has supported much basic research on human behavior yet relatively few administrators have tried to apply the findings in Government, which, however, has done well in many phases of personnel administration. Training programs, for example, vie with the best elsewhere. But human relations practices tend to lag in a situation minutely controlled by law and regulation. Promotion on merit, a frequent slogan, is hard to achieve. Too often the colorless person without opposition rises, rather than the person of originality and courage who through his efforts might antagonize some who oppose change. A person of high skill and imagination may enjoy the satisfaction of working on an important program but he may incur the jealousy of superiors or colleagues of lesser talent. Some of the best management people have failed of promotion or have even been nudged out of their positions.

Such a situation is due in part to a natural tension between persons who have a scientific and administrative viewpoint and those who are politically minded. The former deal with principles, whether in science, engineering, or human relations; the latter consider not "what" but "who." In the latter case, loyalty is sometimes personal to the boss or to the gang, rather than to ideals or ideas.

The "bonds of organization" are subtle and not well understood. It is easier by far to destroy morale than to build it; and easier to build from the start than to restore after it has gone to pieces. *First priority for management research and experimentation should be given to the means for redressing a situation of disintegrated morale.* Now, when the Communist power appears bent on producing disintegrated morale in the United Nations organization, this subject appears to be as urgent as deterrent physical weapons.

Mr. Hyde mentions recent contributions to problem solving but he does not stress the human side. Government offers some

of the best illustrations of *teamwork in interdisciplinary research*—a model which could be greatly extended to other areas of problem solving. In a world where violence (force or war) is a constant threat, methods of problem solving—roads to agreement—are urgent. At least one study under a government research grant showed the relation of personal insecurity to authoritarian behavior. The person suffering from insecurity often swaggers under the guise of "tough-mindedness." If he does not believe in himself he seldom believes in the power of reason, control, and good humor to win an argument—instead, he tends to invoke the force of a higher authority or of the big stick. *Democratic behavior in a group may well rest on mental and emotional nurture for the developing human being.* Such nurture is considerate and "tender-minded." Since government by its nature is conceived as exercising "authority," there is a gravitational pull toward government administration of those who like to wield authority rather than exercise persuasion and conciliation. *The continuance of free institutions may depend on the development of democratic methods to an increasing degree in government itself.*

Insecurity of the individual is heightened in an epoch when "everlasting values" seem to be yielding to "constant change." It is the essence of management to produce change, either as an experiment or as a calculated move for a better result. *Dynamic management is a major agent of change in our society.* Reorganization follows reorganization; new techniques overtake old. So far, in such change, less attention has been given to the human being than to the physical or paper product. The tremendous mass of government tends to roll over the individual, mashing him flat or sometimes rolling him up to high position. The research of the last decade indicates potently the need for consideration of the human being in change. Management has generally construed this need in terms of seniority and qualifications rather than of potential for acquiring new skills and for further growth. *Research shows that groups with high morale and cohesion are resistant to changes forced upon them but co-operate effectively in changes in which they participate.* In most of government this finding is honored in the breach rather than in the observance. Change may be regarded as doom rather than welcomed as promoting better results and providing personal and group growth.

Little thought appears to have been given to the social effects of change in a major activity of the Federal Government—foreign, economic, and social development. Yet under the impact of Western contact, old social systems are breaking up, sometimes, as in parts of Africa, with little alternative to disintegration. That continent has immense economic, political, and military significance to the United States. Our government has already embarked on increased aid to Africa. This may miscarry unless the scientific approach is quickly added to political and economic considerations. The sociological, anthropological, and psychological facts are not only relevant but may be strategic. As yet there are relatively few social scientists at work in Africa even researching what is, let alone giving their judgments, based on their scientific disciplines, on desirable means for effecting sound development without disruption. It is still unpopular in relevant circles in the Federal government to mention the need for social scientists. Yet it is a cardinal management responsibility to see that all needed components are taken into account in decision-making.

Mr. Hyde describes the enormous complexity of the President's job as general manager of the government, with reference also to his ceremonial role as chief of state. Mr. Hyde does not refer to the third role of leader of his party. Yet the relation between the executive and the political function is a major difficulty of government. One of the second Hoover Commission's achievements was to highlight the distinction between the *career civil servant* and the *"political" appointee.* The career man responds to the "general manager" concept. But political leadership is exercised at the apex of government through persons politically responsible to the President for fulfilling politically conceived and stated goals. Hence the heads of departments and agencies must be responsive to the President as chief of the party. Each of these heads also needs a small number of persons chosen for their value in carrying forward the political goals. In the British Government, the roles of the two types of administrators are well understood and respected. In this country the roles are more fluid and the relationship often far from satisfactory. The political appointee is often less knowledgeable than the career civil servants who report to him. The latter may resent having a layman who knows less than they do and who is often lacking in pertinent experience. The appointee may suspect and fear the civil servants and may regard their knowledge as a threat rather than an asset.

A missing element is training for the new appointee. Too often, he comes from business on a leave of absence of a year and takes most of that time learning how to operate in a new element. This problem is again of great urgency in the transfer of power between Administrations in 1961. Explicit recognition of the differing responsibilities of the career man and of the political appointee, coupled with better preparation and training of the appointee, should promote mutual understanding and organizational effectiveness.

The discusser agrees with Mr. Hyde's conclusion: "The basis of experience, knowledge, ideas, identified problems, and broad public-private collaboration has been provided for a new creative surge of progress in government management."

Author's Closure

Mrs. Niles has identified important additional points that should be included in a balanced summary of Government management 1950–1960. She has described them cogently and persuasively. I endorse her comments and thank her for filling out insufficiencies in the discussion.

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Practices in Operational Management—Personnel Management[1]

THE decade 1950–1960 was for the field of personnel management a period of stress and strain on traditional approaches in employee relations. It was a period of transition and, potentially, one of the most critical periods in the history of labor-management relations. The changes and adjustments that took place during this period reflected management reaction to the cumulative impact of social, political, and economic developments since the war period. In particular, the business recessions of 1953–1954 and especially of 1957–1958 confronted management with the necessity to reappraise the prevailing and generally accepted systems in personnel administration.

In the face of this challenge, established concepts of sound employer-employee relations were searchingly examined. This questioning of traditional patterns revealed defects in the organization for administration of personnel matters, and the effectiveness and adequacy of such aspects of the personnel field as supervisory training, management development, and employee communications were seriously questioned. Management also found that the changing tactics and objectives of organized labor necessitated shifts in the focus and nature of the collective-bargaining process.

On balance, though the decade was one of ferment, it was a period of re-evaluation, transition, and real progress. A review of the more significant developments of the period, on the economic front and in organized labor and government, is essential to an understanding and proper assessment of their effects on personnel management.

Significant Developments in the Decade

Some of the many important developments in the area of management-personnel relations in the decade 1950–1960 had their origin in the upheaval in our productive economy that occurred during World War II. Probably many more of them were engendered by the events and trends that have taken place in the economy since the war. These developments stemmed from four sources: (*a*) From factors in the nation's economy; (*b*) from shifts in the distribution and utilization of manpower; (*c*) from developments in organized labor; and (*d*) from governmental action.

Factors in the Economy. Progressive upswings in the level of labor costs for businesses throughout the nation have induced new approaches in operating methods and in the use of the labor force. This cost trend coincided with the unprecedented expansion of the peace-time economy which occurred in the years immediately following the end of World War II, and carried over into the early years of the past decade—an expansion that was further accentuated by the Korean War. Soon after the end of the Korean episode, however, a countervailing development began to be evident. This was first manifested in a strong resurgence of competition in the manufacturing sector and a rapid increase of manufacturing industries in European countries and in Japan.

The turn in the tide of the economy was confirmed by the recession of 1953–1954 and another recession after an interval of only three years. This incidence of business recessions caused manufacturing managements to seek at a greatly accelerated rate ways of reducing production costs through the introduction of cost-saving equipment and methods, and by tightening the job structure to confine fixed operating expenses. Management effort along these lines was already under way during the recession of 1953–1954, continued with little or no abatement after that recession, and moved on at an even greater pace with the onset of the 1957–1958 recession. Thus, while the economy operated at high levels of efficiency and profit, management has had to advance the pace of technological and other improvements in order to keep operating costs within reasonable bounds.

Manpower Changes. Two significant changes affecting the labor force occurred during the decade. One was the reversal of a situation of general shortage of manpower in the early years of the decade, and more so during the Korean War, to that of increasing unemployment, especially during the recession of 1953–1954. According to the United States Department of Labor, the nonagricultural gainfully employed labor force increased steadily during the entire ten-year period, from 52,450,000 in 1950 to 60,765,000 by April, 1960. However, during the same period gainfully employed workers in manufacturing, mining, and transportation increased by only 1,130,000. This reflects the relative decline in job opportunities in these three sectors of industry. Up to the end of the decade, the general trend continued to be a decrease in jobs in transportation, communications, mining, and utilities—particularly railroads and coal mining—and a steady rise in employment in the service industries and in trade.

The second development that occurred was a decided shift in the occupational structure of the labor force. A relatively smaller proportion of people were in blue-collar jobs—skilled and semiskilled—and larger numbers had moved into white-collar occupations—particularly those requiring high levels of education and training. Of course, this shift has been in part coincidental with the major shift in the workforce from goods-producing to service-producing industries. But this increase in the proportion of salaried, clerical, technical, scientific, and professional personnel is taking place within manufacturing industry itself, largely because of the demands of technological improvements.

Developments in Organized Labor. The decade under review was marked by three significant developments in the field of organized labor. The labor movement reached a plateau in its growth. Gains in union membership failed to match proportionately the increases that occurred in the gainfully employed workforce, and in the latter part of the period actual trade-union membership fell off. A further development was the merger of the two major labor unions into a single AFL-CIO organization. The merger itself created heavy stresses and strains within the labor movement, and the attendant problems are not yet fully resolved.

[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

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The third development was a decline in favor and prestige of organized labor in the eyes of the public. The public began to feel that organized labor bore at least a substantial share of the responsibility for inflation caused by ever higher wage costs and higher prices. Moreover, the disclosures of the McClellan Committee with respect to abuse and corruption within some of the larger and more powerful international unions accentuated public suspicion of the union movement.

Governmental Influence. The decade was marked by increased concern and intervention of government in labor-management relations. This was primarily in response to a combination of the necessity for wage and price controls during wartime and a resentment on the part of the public against bearing the economic losses of major labor disputes, especially those affecting an entire industry. The advent of the Korean War led to the establishment of the Wage Stabilization Board, which failed in its attempt to devise a workable formula for wage control, and eventually this effort virtually broke down. The government's anxiety and concern over the impact of major labor disputes on the economy are reflected in the fact that out of a total of 17 cases, during which the emergency provisions of the Taft-Hartley Act have been invoked, 10 occurred during the past ten years. The most important of these was the intervention of the government, under the Taft-Hartley Act, in the steel strike of 1959 and settlement of this dispute finally through intervention of the Administration.

The foregoing brief review of developments in each of the areas noted should help to clarify the nature of the pressures and forces that brought about significant and substantial adjustments in personnel policy and management practice. The later discussion deals with some of the more significant developments in personnel management and in management-union relations, with some comments on the role of government.

Major Developments in Personnel Administration

Major developments in personnel policy and practices have naturally varied widely among industries and between various companies within each industry. However, the common factor in all such developments is that, for the most part, they have come about to meet economic forces and the pressures of organized labor, and because of the increased awareness of management of the vital importance of sound employee attitudes and reactions in achieving efficiency in business operations.

Most of the developments in the field of personnel management, as distinct from problems of union relations and collective bargaining, can be counted on the constructive side and probably listed as permanent gains. The following may be cited as among the more encouraging and constructive developments of the decade:

1 *Continuation of chief executives' interest, concern, and participation in personnel policy development and implementation.* An upswing in the interest of top management in employee relations was pointed to as perhaps the most significant development during the ten-year period from 1942 to 1952. This trend continued at an increasing tempo, as evidenced by the steady flow of public addresses and pronouncements by chief executives, stressing the importance of relations with employees as a matter of primary concern to corporate executives. Probably the most potent considerations that have focused executive attention on personnel problems is the recognition that the success of any enterprise depends on the people in it, and a realization of the untoward effect on employee relations of workforce adjustments that result from cost reduction, mechanization, and economy programs, to offset the rising costs in running an enterprise.

Some of the most formidable obstacles encountered by management in efforts to implement cost-reduction and economy programs have been the lack of understanding by employees of management motives and their active resistance to management approaches. More and more chief executives have become convinced of the necessity of taking the case for these measures directly to employees through more effective communication with them. Chief executives also have seen the need to stimulate employee interest in and understanding of management problems, and to a great extent this approach has offered unparalleled opportunities for personnel staffs to contribute to the health and success of the enterprise. Thus we find that increasingly the industrial relations function in companies is directed from the top counsels of management. A steadily mounting number of companies have accorded officer status to the chief industrial relations executive, and in some cases he is on the board of directors. This trend has risen sharply during the decade and promises to continue to do so.

2 *Greater concern over the situation of white-collar personnel.* Until rather recently, managements generally have tended to view personnel administration primarily in terms of matters affecting hourly paid or organized employees. In some companies the top personnel director reported to the vice-president of manufacturing. The headquarters industrial relations staff had no jurisdiction in or responsibility for personnel administration in marketing departments, research laboratories, and accounting departments, or for other white-collar groups.

The past ten years have brought a very definite change in this situation, and there has been real progress in the direction of broadening the scope of the personnel function to apply in all departments of the company.

3 *Decentralization of personnel administration.* The trend toward decentralization of personnel administration, especially in multiplant operations, has continued at an accelerated pace. While headquarters industrial relations staffs are in most cases responsible for over-all guidance of the personnel program, more and more there has been a tendency to assign specific responsibility for employee relations to the head of each operating unit, and to provide such staff assistance as the size of the operation warrants. While originally this decentralization was thought to make possible substantial reductions in headquarters staff, in practice only limited reductions have occurred, because of the necessity for liaison between top management, the headquarters personnel staff and local managements and their staffs, in handling the pressing problems connected with co-ordination of personnel administration throughout the enterprise.

4 *Organization planning and executive development.* The advent of organization planning and executive development as major features of corporate personnel programs was an outstanding advance in personnel administration during the past decade. Time after time managements had been faced with a dearth of executive talent within their companies when growth, retirements, and other eventualities created openings in the management hierarchy, and replacements had to be found. While in earlier years attention had begun to focus on this constantly recurring problem, it was only within the past ten years that management reached and acted on the conclusion that structuring of the organization and the continuing development of an adequate management team could not be left to chance. Great strides have been made in installing systems for the forecasting of management manpower needs and the development of qualified "back-up" men for management positions.

5 *Improved salary administration.* Even less than ten years ago, job classification and evaluation and formal pay structures had been applied primarily to hourly rated occupations. Before the end of the decade, however, there was a broad extension of formalized salary administration, based on position description and evaluation—in many cases applicable to high executive positions. During the period 1942–1952 management

was perhaps vulnerable to the criticism that it had neglected the application of sound personnel procedures in the area of compensation for salaried personnel. But in more recent years systematic salary administration has been widely adopted by managements and stands as one of the most constructive developments in the field of personnel management.

6 *Attention to the problems of professional and scientific employees.* The past decade marks the first period in which the problem of relations with professional and scientific employees has become of major importance. The rise in the proportion of scientific and technical personnel in the total force has been so sharp as to pose an especially difficult problem for management. In these past ten years we have seen the beginnings of a constructive approach to this problem, evidenced by the development of special promotional and compensation ladders for professional employees. There is a growing appreciation that stimulating work assignments and opportunities for growth through exercise of creative abilities and resourcefulness, and with commensurate pay, are essential elements in developing sound and co-operative relationships with these groups of employees.

7 *Employee communications.* The concept of employee communications as a two-way process, involving transmittal of information from management to employees and the channeling of employee questions, opinions, and reactions to management, has achieved the most widespread acceptance during this latest decade. Employee communication is viewed today not as a mere tool of management, but as a medium for developing sound relations between management and employees and among all levels of management. It has been demonstrated repeatedly that effective communication with employees engenders among them understanding, acceptance, and co-operation when operational changes are necessary. Pronounced progress has been made in this area in recent years, and this is a significant tribute to management perseverance; for this progress has been achieved by trial and error and through an appreciation that employee thinking and viewpoints cannot be suddenly altered, and that for maximum effectiveness communication with employees must be continuous and must be an integral element of the management process.

Probably at no other period in history has management resorted more frequently or intensively to communications in periods of crises, such as in representation elections, collective-bargaining negotiations, and strikes, and when operational changes involve significant manpower adjustments. This has been so because management has overcome its traditional reticence about speaking forthrightly on employee relations issues.

8 *Changed concept of sound employee relations.* A significant development of the past ten years has taken place in management thinking and philosophy as to the basic concept of the factors that make for satisfactory employee relations. Increasingly, managements are accepting the concept that desirable standards of employee relations do not necessarily result or stem from high wages, liberal pensions, and benefits, or competent and adequately manned personnel staffs. These have their place, but they alone cannot be relied upon to produce and maintain the kind of employee attitudes and relations that will assist an organization in adjusting to change. There is a progressive recognition that satisfactory employee attitudes are the product of the total management process and can only be achieved as a result of operating management's concern for, and insistence upon, fair treatment and consideration for the individual employee in the day-to-day operation of the business.

Management-Union Relations

Probably the most spectacular and disturbing events in the whole field of personnel management within the past decade have been those involving relations between management and organized labor. The two recessions in the economy during this period had an impact on management-union relations and were responsible for marked shifts in the scope, methods, and issues of collective bargaining. The steel-industry negotiations of 1959, followed by the 116-day strike, was probably more serious in its implications than any comparable development since management-labor relations have been regulated by law. This strike revealed and dramatized the power of international unions to shut down basic industries and to keep them throttled, even though the health of the national economy is impaired. The progress of the steel-industry negotiations exposed glaring deficiencies in the concept of collective bargaining held by the union, by the government, and even by many in industry. The strike history of the decade, culminating in the steel strike of 1959, has raised grave concern in the minds of the public as to the effectiveness of collective bargaining as an instrument for industrial peace.

An outline of the more significant developments in the area of management-union relations during the decade of the 1950's follows briefly.

Significant Features of Collective Bargaining. The past decade witnessed widespread extension of important features of collective-bargaining contracts, including cost-of-living escalation, long-term contracts, and automatic annual increases, sometimes referred to as improvement-factor adjustments. The trend toward negotiation of contracts covering periods of more than one year became apparent in 1950, and by 1960 had reached impressive proportions. The majority of these contracts run from two to three years, and generally provide for either fixed periodic increases or wage reopeners. Recent figures published by the United States Department of Labor show that a total of 246 contracts covering 5000 or more workers, and with 1960 expiration or reopening dates, 80 per cent were for a period of more than two years or longer, and 15 per cent were for four or more years.

Pensions and Fringe Benefits. The negotiation of improved pension, health, and welfare plans has continued in the past ten years, and a new concept of employment costs was utilized by the steel industry in its 1959 negotiations. Under this concept, employment costs are defined as the cost of keeping an employee on the payroll one hour. While figured variously, as between companies, it usually includes the cost of wages, salaries, pensions, and other benefits, social security taxes, and all other such payments. In the "Monthly Letter on Business and Economic Conditions" issued by The First National City Bank of New York, data on the distribution of the sales dollar in 100 of the largest corporations show that employment costs rose from 24 cents per sales dollar in 1953 to 27 cents in 1959, and that the annual average cost per worker for wages, salaries, and all forms of fringe benefits rose from $4200 to $5800 in the same period.

Supplemental Unemployment Benefits. Supplemental unemployment benefits as a substitute for the union demand for a guaranteed annual wage made its first appearance as a result of negotiations in the automobile industry in 1955. It was later negotiated with the steel industry in 1956 and with four major rubber companies in 1958. These plans are the pool-fund type. An outstanding departure from this type is the plan negotiated with the Pittsburgh Plate Glass Company, which is set up on the basis of individual employee accounts and the utilization of credits to individual accounts for certain specified purposes, in addition to layoff.

While supplemental unemployment benefit plans were set up in a few other companies, the movement has not spread to industry generally. The emergence of supplemental unemployment-benefit provisions in collective-bargaining settlements is

evidence of the concern of organized labor over employee security in a period of rapid technological change. This concern continues, as some recent settlements have called for the establishment of automation funds.

Collective-Bargaining Encroachment on Management Functions. A most significant shift in the character and direction of union collective-bargaining objectives took place during the past decade. It took the form of increased pressure for concessions in the area of managerial functions and operational control. This movement, which was foreseen in the decade 1942–1952, became much more formidable during the past ten years, because of the attempts of unions to counter or offset the effects of mechanization and advances in the use of labor-saving devices. These attempts included resistance to the elimination of outmoded jobs and to contracting-out of work, demands to bargain over staffing of new equipment, opposition to reclassification of jobs, demands for joint determination of layoffs, and insistence on holding onto entrenched but indefensible work practices, restrictive contract clauses, and other forms of uneconomic work practices.

As a result of management's determination to secure relief from wasteful and costly practices, a number of the most serious strikes during the period had nothing to do with wages but involved efforts of the union to control output, set production quotas, and cling to wasteful, restrictive work practices of long standing.

In the face of these developments of the past decade, collective bargaining can no longer be considered as a system concerned solely with hours, wages, and working conditions. The area covered by collective bargaining has been broadened to include all types of issues involving the operation of the enterprise, from the right to select supervisors and staff new operations all the way to profit sharing and price determinations.

Emergence of Management Initiative in Collective Bargaining. One of the most potentially promising developments in the period under review has been the show of initiative on the part of managements in union relations and collective bargaining. This is a relatively new approach. Government regulation during wartime and the overwhelming economic power of organized labor, together with prolonged periods of unprecedented prosperity, all combined to discourage management planning, initiative, and aggressive action.

During the past decade this attitude began to change, as manifested by the increasing practice of prenegotiation communication with employees on anticipated collective-bargaining issues, notice of intention to terminate the contract rather than continue operations on a day-to-day basis, rejection of retroactive application of contract terms, and, in the absence of a negotiated settlement or contract, taking unilateral action to initiate wage adjustments and changes in seniority, grievance policy, and other practices that had been matters of contract. There has been a noticeable firming of the posture of management at the bargaining table, a growing willingness to take strikes rather than yield to unreasonable demands, and far more frequent resort to intensive communication and publicity activities directed at employees and the community, both before and during labor crises.

The Role of Government

Up to 1959 the national emergency provisions of the Taft-Hartley Act had been invoked by presidential action a total of 15 times. But as a result of the strikes in the longshore industry and in the steel industry, the cases of recourse to the emergency provisions of the Taft-Hartley Act rose to 17, and of these, 10 occurred within the past ten years.

Because of widespread public concern with the powers and the abuses of power of organized labor, the Senate Select Committee on Improper Activities in the Labor or Management Field (McClellan Committee) was established in January, 1957, and conducted hearings from 1957 into 1959. Stemming from the disclosures before this committee, Congress moved to enact legislation directed at reform of the internal affairs and conduct of labor unions. The resulting legislation, known as the Labor-Management Reporting and Disclosure Act (Landrum-Griffin Act), became law on September 14, 1959.

Taken together, this governmental intervention in strikes and legislative action affecting labor relations reflect the rising concern of the public over the economic power possessed by organized labor, its partial responsibility for wage-price inflation, and the abuses and corruption revealed in the internal affairs of some of the largest unions. On balance, the concern of the public and the role of government in labor-management relations advanced substantially during the past decade. A serious distrust has developed of the effectiveness of collective bargaining in terms of the public welfare, and this forecasts for the next decade a dissatisfaction with many features of the present national labor policy.

In Conclusion

Personnel administration in the past decade held many challenges for management. Problems posed by two closely occurring recessions, by crises in labor relations, and by a continuously expanding economy brought about a questioning attitude in management circles and a reappraisal of the merits of traditional approaches in administering personnel matters. The decade has been characterized by strong executive leadership in employee relations, a more outspoken approach in communicating with employees, and a more assertive attitude on the part of management in dealings with organized labor.

These overriding developments have reinforced an approach to personnel policy that is designed to keep it flexible and, therefore, more attuned to the times. Thus, some traditional concepts were discarded, emphasis shifted, and on the whole management made bold strokes in its effort to resolve the problems it faced. Whatever may be the problems of the future, managerial sensitivity to the need for a dynamic personnel program bodes well for the administration of employee relations in the next decade.

DISCUSSION

Michael J. Jucius[2]

Even a casual reading of this paper is sufficient to impress one with the full coverage and careful analysis which the author has been able to pack into such a short space. And close scrutiny of it leaves one in a laudatory frame of mind. In short, it is an admirable summary of the forces acting upon and the effects in the field of Personnel Management during the Fifties.

Such comments as do come to the mind of this reviewer of this article are more in the nature of emphasis rather than of criticism. For example, Mr. French makes some significant notes on how and why management has given greater recognition to the personnel factor. This reviewer would like to suggest that in part this is due to a continuation of the trend to replace the old-time (and perhaps ultraconservative) executives by the new generation of executives formally trained in a broader view toward the personal and social implications of business. This broadening base is also evidenced by a greater interest in the Fifties in politics, philosophy, ethics (also religion), and community relations as they pertain to personnel and human relations.

Another aspect of emphasis is that of the degree and extent to which personnel management has improved during the Fifties. To be sure, Mr. French has rightly cited several areas in which

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progress has been made. Unfortunately, however, we do not know how many companies have been progressive. There are leading companies in better practices and these give gratifying evidence of progress. But how about the rank and file company? We could use more statistics on this picture to have proof that the leaders are representative of advances on a broad front of business.

This matter of statistics brings to mind the matter of research. The Fifties must be credited with some significant investigations which served to cause business executives to question traditional concepts of personnel practices. Here it would be well to mention the impact of various universities and their researches in such areas as communications, morale, executive training, selection, and motivation.

This short review may well be closed on a critical note, not on Mr. French's excellent paper, for he correctly restricted himself to a constructive review of the Fifties. The point to be made turns on the proposition that each decade must be judged not only on the solutions which it brings to its own immediate problems but also on the preparations which it makes to meet the problems of the future. Thus in the Fifties, in this reviewer's judgment, personnel management did not do enough to prepare for the coming impact of automation, an economy operating under the conditions of a cold war, and the growing competition of a new complex of international nationalism and relations. In brief, personnel management must take greater strides in the direction of increased foresight and statesmanship to meet the challenges of the future.

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Practices in Operational Management—Local Government and Other Nonprofit Organizations[1]

During the past decade, there has been a gradual change in the philosophy of operational management among governmental and other nonprofit organizations and institutions. This change has been prompted by the demands of the public for greater return for the tax dollar, both in services and results. The citizen is concerned, more than ever before, by the spiral of increasing costs, taxes, etc., and while he expects to pay for what he wants, at least he wants value received.

This change in philosophy has created a desire for better training of potential managers and has produced a new class of executives, "The Professional Managers." The achievements of the professional managers in many cases far outrank the results of the managers who have grown up with the organizations. Good training and an objective viewpoint without being inhibited by tradition and internal politics is the criterion of the professional manager.

Local Government

It is at the local level in our political subdivisions—the grass roots—that some of the greatest changes in the practices of operational management have taken place. Under pressure of economic factors, these changes have been forced, so to speak, by the voters who, once aroused, usually get things done.

Many businesses, both small and large, encourage the personal participation of their executives and workers in politics. Increasing numbers of people from industry and business are seeking nomination and being elected to school boards, city councils, local judgeships, and even mayoralties. The infusion of the business aspect in government affairs as generated by such corporations as Ford, duPont, General Electric, Johnson & Johnson, and many others, the labor unions with their committees for political education, and management organizations, such as the Society for Advancement of Management, has brought gratifying results in the local political subdivisions.

During this decade many cities, towns, and villages have felt the impact of this movement and have brought about substantial improvement in their operations. One of these, a large eastern city, will be used as an example to illustrate the kinds of changes which typify such progress in municipal governments.

Aided by the passage of a new City Charter approved by the electorate, a new mayor and slate of officials were elected in 1951. The new Charter gave the new mayor and his official family the machinery that had been lacking in the traditional old city, even if a reform government had been elected previously.

With new tools, the new management set about establishing an administration that was modern in concept, streamlined in operation, and which has been proved in almost a decade of trial.

In addition to the Mayor, the new city organization includes an administrative executive, the Managing Director; a fiscal administrator, the Director of Finance; a ceremonial and development administrator, the City Representative and Director of Commerce; and a legal administrator, the City Solicitor. All are appointed by the Mayor; they make up his cabinet and report only to him. The only exception to this is the City Solicitor who reports to a separately elected city council, since his department's legal clientele includes the council.

Operational departments then perform their functions under line administration, usually commissioners, who are responsible to officers of cabinet rank. Gone are such outmoded concepts as a Department of Public Safety which combined such different functions as Police, Fire, Traffic Engineering, Building Inspection, and Communications.

The new chart shows instead a Managing Director who co-ordinates these functions under commissioners and also such other services as central record keeping, welfare, streets, health, and recreation.

The new Department of Licenses and Inspections incorporates all inspection functions which closely follow the licensing of buildings and construction projects. Another new department, Public Property, is responsible for maintaining all public buildings, grounds, vehicles, and other properties including the vast communication system used by the Police and Fire Departments and others. Public Property also provides to collateral agencies a variety of staff services, such as engineering assistance, custodial services, and inter-office telephones.

The Department of Records not only supplants the old county office of Recorder of Deeds, but also reviews and advises record keeping methods and forms for all departments, performing microfilming and duplication services for them.

In the field of government finance, the Charter makes possible one of the City's greatest administrative advances by establishing a six-year capital budget program. Undertakings by the Mayor and his cabinet put life into this process through the office of the Managing Director, the City Planning Commission, and the office of the Director of Finance.

Through careful planning by these offices, the City Council was presented with and adopted budget legislation leading to the building of new recreation, welfare, health, police, fire, streets, water, sewer, and other public facilities that were long awaited and sorely needed.

A sound fiscal policy was established by gradually increasing the operating budget to finance a percentage of the project costs out of current revenues. This "pay-as-you-go" concept is now firmly fixed at a level of 10 per cent of all capital projects.

In addition to such far-reaching public manifestations of advanced city management, many program improvements have been made by the newly organized line departments and staff agencies. Some examples of these are:

1 Traffic Co-Ordination Committee. A committee consisting of representatives from various departments meets whenever a construction contract is being prepared which may affect the

[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

Contributed by the Management Division and presented at the Winter Annual Meeting, New York, N. Y., November 27–December 2, 1960, of The American Society of Mechanical Engineers. Manuscript received at ASME Headquarters, August 5, 1960. Paper No. 60—WA-126.

movement of traffic. A representative of the contractor is often present as are members of the various private utilities to assure that everyone will have a general understanding of construction requirements as they are related to traffic co-ordination. Since the establishment of the committee, critical construction work has been scheduled for off-peak hours, including a late-night shift, in order to avoid congestion in busy areas.

2 Installation of Fire Check Programs. Firemen drive their equipment to community neighborhoods, remain on radio, and make a block-by-block canvass of the areas, examining buildings and houses for dangerous conditions that could result in fires. This program has caused a phenomenal decrease in the number of building fires and has contributed greatly to the successful, formal inspection program conducted by the Department of Licenses and Inspections.

3 The Mayor's Office for Information and Complaints. Professional and clerical personnel have been located in an attractive office which is conveniently reached by the public. Appropriately designated as the Mayor's Office for Information and Complaints to indicate the Mayor's personal interest in public reaction to city services, this unit processes all telephone and written complaints as well as oral ones reported by individuals who stop at City Hall. These are acknowledged and channeled through the departments that are responsible for supplying specific information and/or correcting the particular situations or conditions.

4 Traffic and Transportation. A central staff under the Office of the Managing Director is responsible for the long-range solution to traffic and transportation problems in the metropolitan area. This agency, known as the Urban Traffic and Transportation Board, develops top-level policy information for executive and legislative decisions. The staff must also co-ordinate its activities with other departments, such as the Department of Streets, and private agencies such as the transportation company, or the various railroads.

5 Emergency Co-Ordinator. The Managing Director's Office also supervises an emergency unit which crosses a number of departmental lines to operate at greatest possible efficiency. Headquartered in the Public Property's communication center, it goes into operation with impending weather and other emergency situations, gathering information, deploying personnel, and disseminating information directly to the major news media. Its staff includes key commissioners and/or staff of Water, Streets, Public Property, Public Information, and other divisions.

6 The Use of Meter Maids and School Crossing Guards. Neatly uniformed women took the place of men in the patrol of parking meters in busy business areas and the directing of traffic at school intersections, freeing policemen for tougher assignments.

These are representative programs that have been adopted by the professional administration under the new charter in addition to a large number of internal administrative improvements.

During the first four years under the new form of city government, considerable emphasis was placed on the improvement and expansion of services rendered directly to the public. Staff services were, for the most part, directed and carried out by such central agencies as the Managing Director's Office and Finance Director's Office. Only a limited decentralization of these staff functions was in effect at that time.

In early 1956, the City's top executives recognized the need for strengthening the administrative operations in the major service departments. A firm policy was established whereby administrative organization, wherever possible, would be planned as closely-knit "clusters" under the direction of a top administrative officer who would report directly to the commissioner of the department.

In some cases, this administrative officer would be at a deputy commissioner level, but in all cases these administrative positions would be classified under the City's civil service. The goals of the policy were to strengthen the department administrative operations and to provide a continuity of leadership. The prime purpose for the establishment of "clusters" was to provide co-ordination of administrative information relative to the operations of the department. Programming, analyzing, recording, and interpreting information coming from both the departments' operating units and the City's staff services are a major part of the administrative function.

The extent of specialization within the administrative clusters is directly dependent on the size and operation in the respective department. For example, in the larger departments, a class of "Budget Officer" is used. The person of this class is responsible for preparing, analyzing, and evaluating requests, and for establishing controls in the departmental budget process. In the smaller agencies, this function is performed by either the top administrative officer or a general staff assistant.

The cluster plan has been implemented as rapidly as possible by the departments. Meanwhile, the administration, in recognition of the need for perpetuating the administrative position concept, has embarked on a training program that is geared to (1) the development of potential career officers; and (2) the dissemination of essential information among high-level, administrative personnel.

After about eight months of careful planning by the major staff officers, an administrator's internship program was begun in September, 1956. Designed to attract individuals holding a Master's Degree in some areas of Public Administration or Political Science, this program is a fifteen-month, rotating internship consisting of three months spent in the Office of the Managing Director and the remaining twelve divided either between service departments or spent entirely in a single department.

Along with practical assignments in the field of administrative management, each intern is exposed to fifteen weekly seminars conducted by heads of the various service units, like the Budget Bureau, the Purchasing Division, the Classification and Pay Division, and Legal Services

Various reporting systems have been established which reflect information that management can use for important decisions which cross departmental lines. Some examples are the position control procedure which calls for departmental authorized position lists and position action requests where an organizational change occurs; the sick leave control report which reflects the amount of time taken by each department and charged against authorized sick leave; the uniform system of reporting accidents which has given important information for preventing similar future accidents; and an automotive maintenance cost accounting system, a mechanized report having an individual equipment punch card for every item of equipment reported by the City.

Microfilming, firmly established within the new Department of Records, replaced legal documents occupying thousands of cubic feet of space. A duplicate set of film is prepared in all cases where records are determined to be vital; these are stored in a remote vault.

Other important records amenable to the microfilming operation have also been filmed. For example, the maintenance of real estate property records, a function which directly involves the public, was transferred from the City's Department of Streets to the Department of Records in 1956, resulting in a streamlining of the procedures that are used to provide information to the title companies, real estate brokers, city officials, and the general public.

In addition to making possible a sizable annual savings, the microfilming and jacketizing of deed records provides for permanent preservation, the use of far less space, and ready

availability of the records to the public. The processed deed can now be returned to the grantee within five days, in striking contrast to the old procedure which took fifteen to twenty days.

As in the instance of other governmental management, two basic elements continue to be necessary—a strong framework and an alert, informed administration to shape it. In both cases, the burden rests on the voters who are both the "stockholders" and the customers. Even with the framework established, and an efficient organization molded, continued operation and further implementation still depend on informed and active public interest.

To a large extent, citizen enthusiasm also has become centralized along functional lines. Public-spirited groups, committees, and organizations are being formed and consulted regularly. Information on current trends and plans is presented daily through public meetings, newspapers, films, radio and television programs, and other media. These functions, regardless of which department's services are involved, also are co-ordinated and initiated by a central office. Under the City Representative and the Director of Commerce, citizens are consulted and informed by the same department that promotes, informs, and "sells" the City's services and advantages to tourists and businessmen of other communities.

Schools and Colleges

Management of educational institutions in the Fifties was dominated by two major conditions: The beginning of an almost explosive growth in enrollments; and the rising costs of operation coupled with attempts to bring faculty salaries up to levels more nearly competitive with industry.

In the elementary schools and high school systems the "baby boom" of the latter half of the 1940's began a progressive wave of increased enrollments grade by grade and also in total, reaching the junior high school level by the end of the decade. The continuing higher birth rate, above the pre-war level, indicates that this trend will continue through the next two decades.

At the college level enrollments were swollen by the larger percentage of high school graduates going on to college because of the increasing opportunities in industry for college graduates. A large number of these students were enabled to continue their education under the provisions of the G-I Bill and by means of scholarships. In urban college centers night-school enrollments also skyrocketed because of the demand for college educated people in industry. Many companies made available tuition aid to employees who enrolled in such courses leading to degrees.

As a consequence of the swelling enrollments, facilities expansion and increases in staff were pressing problems to school boards and administrators alike. At the same time increasing costs of construction and operation along with teachers' salaries have made demands on taxpayers which call for more efficient utilization of all resources.

Work was started to develop and put to use electronic aids to teaching, particularly closed-circuit television, as a means of bringing the best available instruction to large numbers of pupils most economically. While still in the trial application stages, it seems that such new techniques offer promise for both reducing the cost and upgrading the quality of teaching.

Attention is also being given to installing better methods in custodial work, office routines, and cafeteria operation.

While it is not intended to discuss curricula in this portion of the report, it is worth mentioning that these, too, are being critically reviewed in many cases for their adequacy in meeting the needs of today's and tomorrow's complex industrial civilization.

Hospitals and Similar Institutions

The past decade, 1950–1960, has been full of changes in the operation of hospitals from the charity institution concept to the modern, businesslike organization. The challenges facing the voluntary, nonprofit hospital at the beginning of the decade were increased demand for hospitalization by the public, shortage of professional personnel, increased patient costs, improvement in treatment of patients by the use of new drugs, improvement in surgical techniques, and the reduction of the length of stay of the patient which reduces the hospital income by shortening the bed and board portion of the patient stay. All of these problems are still with us, but some progress has been made, and the next ten years should indicate even greater attainment in good operational management.

Many chapters can be written about hospitals, their management problems and cures, but as our assignment is "changes in operational management," we will endeavor to trace changes in this field during the Fifties.

The first real breakthrough was during the early 1940's when Malcolm T. MacEachern, MD, with the moral support of General Robert Wood Johnson, and the financial assistance of Johnson & Johnson, founded the first School for Hospital Administration at Northwestern University. It was when the first and then successive graduating classes of this school became active in hospital management that it became apparent that good things were happening in the operation of hospitals. Other universities soon followed this trend, and at present there are about fifteen Schools of Hospital Administration graduating several hundred prospective hospital administrators every year. These are the people who are changing the management habits of hospitals.

Early in 1950, Harper Hospital in Detroit was faced with a critical shortage of professional personnel and an increased cost of doing business. A committee was formed to study the use and requirements of skilled professional personnel, and the Associate Director of the hospital, Miss Marion Wright, was made Chairman. Early in the program, it was realized that some of the difficulties could be approached from an industrial engineering viewpoint. The Packard Motor Company agreed to lend the services of an industrial engineer, Mr. Owen R. Goodrich. After Mr. Goodrich, a member of the Society for Advancement of Management, joined the Advisory Committee, he suggested that the Detroit Chapter of the SAM be asked to form a committee of chapter members to act as consultants to Miss Wright and the Harper Hospital Committee. The results of this enterprise are documented in Miss Wright's book, *The Improvement of Patient Care—A Study at Harper Hospital.*

Chapters in Boston and Philadelphia conducted work simplification classes for hospital personnel, and considerable interest and results were engendered. Late in 1951, General Robert Wood Johnson, Chairman of the Board of Johnson & Johnson, conceived an idea for a Hospital Advisory Board to furnish the latest techniques in management know-how without cost to the hospital. It has often been stated that hospitals are from thirty to fifty years behind industry when it comes to good operational management. General Johnson assembled a group of industrial technical specialists from the Johnson & Johnson family of companies and formed Industry's Advisory Board for Hospitals. In the beginning, this Advisory Board assisted two local hospitals, but soon the demands for service increased, and then the local chapter (Raritan Valley) of the SAM was asked to consider sponsoring the program as a community project. The response was quick, and the first SAM sponsored Advisory Board was formed. The work of the pioneer Board is documented in articles that have appeared in *Readers' Digest, American Mercury, Advanced Management, R.N., Nursing*

Outlook, and all leading hospital magazines. A selected bibliography is appended to this paper.

It is unfortunate that the work started in widely separated areas and later consolidated into the Civic Affairs activities of the SAM had to be abandoned. This was precipitated by a lack of funds and interest from industry and business. Individual chapters of the SAM are still carrying on this work on a limited basis.

The results obtained from the twenty-odd Advisory Boards connected with the SAM's Civic Affairs program proved conclusively that modern industrial management can be used in the administration of the various functions of the hospital to achieve the following: to improve patient care; reduce costs; and provide a better utilization of the hospital's manpower and facilities.

Many hospitals throughout this country and Canada have been assisted by this program and, from all reports, have benefited to a large degree. The management of hospitals today is big business—the fifth largest industry in the United States. With 7000 hospitals containing $1^1/_2$ million beds and 24 million Americans entering hospitals every year, hospitals are everybody's business.

It is unfortunate that most hospital managements are still unwilling to try new concepts and to take the heroic step of coordinating the medical and business aspects of hospital management to produce a harmonious organization.

In the field of operational hospital management great strides were accomplished during the past decade, but the results obtained have only scratched the surface. There is no real reason for a hospital to continue deficit spending, to construct new facilities that are not needed, not to plan for five or ten years ahead, and not to spread capital equipment expenditures over longer periods. Business could not survive by these tactics—neither can hospitals. More and more hospitals are using the principal of their endowments for current expenses and are finding that fund-raising drives for the same reason are looked upon with disfavor by the public. The Public is becoming very cost-conscious of hospital and Blue Cross rates, and wants value for its dollar and no wasteful spending.

The tools of good operational management that industry takes for granted are just now being utilized in hospitals. There are literally hundreds of hospitals that do not have a good operating budget, other than one that was based on the expenses of last year. Departmental costing is lacking in many, and it is extremely rare that one has complete capital equipment ledgers and controls. Preventive maintenance programs are just beginning to be established in hospitals. Safety and disaster control training projects are sorely needed by the personnel of these institutions and are gradually being established throughout the country.

The use of resident industrial and methods engineers in hospitals is a must, but only a few of the larger hospitals have taken advantage of this type of professional service. In a 350-bed hospital, it is reported that the industrial engineer reduced costs to the amount of $97,000 in one year.

During the coming decade, hospital administration will undoubtedly make greater use of the professional engineers and management consultants. It takes time to change the viewpoints and philosophies of the leaders in the hospital field from "hospitals are charitable institutions and cannot be run like hotels" to "hospitals are big businesses and should be operated as such." When this transition occurs, more hospitals will use better operational management techniques and will be able to reduce costs and make better use of manpower and facilities without sacrificing the all-important patient care.

Selected Bibliography

H. M. Adams, "Industry Contributes Know-How," *Philanthropy*, Spring, 1954.

J. H. Beddow, "Industrial Aid Works Wonders," *Modern Hospital*, June, 1955.

H. G. Dunlap, "Work Simplification in Hospitals," *Proceedings of the Tenth Anniversary Time Study and Methods Conference*, April, 1955, Society for Advancement of Management.

G. M. Goettelman, "Scientific Management Enters Civic Affairs," *Advanced Management*, September, 1955.

G. M. Goettelman, "Industry Know-How Helps Hospitals," *Hospital Progress*, January, 1958.

O. R. Goodrich, "Industrial Engineering Is Applied to a Modern Hospital," Harper Hospital Committee Report, Detroit Chapter SAM.

E. McCormick, "Hospitals Are Everybody's Business," *American Mercury* and *Readers' Digest*, September, 1955.

E. J. Morrison, "Blood Bank Operation Analyzed, Interpreted, Simplified," *Hospital Management*, July, 1954.

M. J. Wright, "The Improvement of Patient Care—A Study at Harper Hospital," G. P. Putnam's Sons, New York, N. Y.

DISCUSSION

Mary Cushing Niles[2]

George M. Goettelman's paper consists of three sections, relating to local government, schools and colleges, and hospitals. He speaks with special concern about the improvement in administration of some hospitals through programs in which he has served. He notes the significance of the first School of Hospital Administration. In recent years the idea of nonmedical administrators for hospitals has spread quickly, due to the shortage of physicians and to good performance by some "laymen," aided by their professional association. The rising cost of medical care puts the spotlight on the need for good management in hospitals.

In the administration of schools and universities also the business manager has come to stay. There is increasing recognition that educational institutions need to apply techniques of management effectiveness. The same is true of libraries and other institutions not mentioned in the article.

In the last decade there has been continued progress in the operation of state and local governments. Mr. Goettelman makes two major points. He describes in detail the reform in one big city. Also, in commending the encouragement which business is giving to participation of executives and employees in politics, Mr. Goettelman notes the adoption of business methods in many political subdivisions. This discusser agrees that businessmen of talent can contribute to local government by bringing to bear the objective methods of management analysis, especially when they are willing to devote several years or more to public service. It is good for businessmen and public servants to exchange know-how and viewpoints. Mr. Goettelman does not seem to appreciate that the main gains in the Fifties as well as the challenge of the Sixties lie in improved *public* administration—a field of greater difficulty, by and large, than business administration.

In the last decade local government has grown by leaps and bounds with the great increase of population, more urbanization, and far greater demands for services. Improvements have been many besides those mentioned by Mr. Goettelman. Civil service systems have replaced the spoils system in additional jurisdictions. Such merit systems have been improved by

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outside and inside study and effort. Inservice training has increased, with attention to supervision. In many jurisdictions promotion has taken place across a broader area, thus reducing "escalator" advancement. For specialist positions, progressively better education and experience have been required and professional associations in each field have helped level up knowledge and performance. This has also been true of managerial positions. The Public Administration Clearing House, the Society for Public Administration, the Public Personnel Association, and the Civil Service League have continued to give national leadership, along with special groups such as the International City Managers Association and numerous others. Public service employees have created a demand for adult education in their fields at universities. They have adopted new techniques, such as automatic data processing.

With denser population and a rising standard of living, the demand for education, roads, sanitation, and health facilities rises from year to year. "Urban renewal" and city and regional planning have become large new fields. Emphasis on recreation covers stadiums, community centers, art museums, and facilities for swimming and sports. Further growth of leisure and income will create new demands on public and private facilities.

These developments make a fresh impetus for stronger and more efficient government. The allocation of responsibilities among Federal, state, and local government is a problem of increased urgency. With faster transportation, metropolitan areas are larger than ever and the overlapping of tax and administrative jurisdictions is vexing to voters and to public servants. The years ahead are apt to bring consolidation and reallocation of functions and greater exchange of public personnel among various jurisdictions. This movement is now impeded by pension and other benefits in restricted areas. Citizen demand will undoubtedly call forth improved quality of services and of methods.

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Management Science[1]

Introduction

MANAGEMENT science is the newcomer of the past decade. There have been many advances in the longer established fields of management during this period. But the beginnings of a new all-inclusive science of management which claims to incorporate and co-ordinate all of them is an event of major significance. Of course, its roots can be traced back into the past and to earlier activities which will be referred to in the following section.

The term "beginnings" has been used deliberately. This paper proposes to deal with the initial developments of the new science. Moreover, the paper itself should be looked upon as a beginning as well. It will provide merely a preliminary picture of events, for there are no final results or conclusions available now.

There was an alternative to wait and "let the dust settle" or to go ahead at a time when the ends can be discerned only dimly. The second alternative was chosen in full realization of the difficulties involved. It was felt that a steppingstone could be established for future work in the field as long as the unavoidable limitations were firmly kept in mind.

The selection of topics to be covered was oriented with a view to the expected usefulness for research. No claim is made that the choices are perfect; the material is too vast and diverse. Critical comments may be expected from those who would have shown different preferences.

From "Scientific Management" to "Management Science"

Captain Henry Metcalf was first to co-ordinate the two terms of management (then called "administration") and science. During the following decades the concept of "scientific management" gained wide acceptance through Taylor, Gantt, and their associates.

The gradual expansion of the concept of management during the first half of the century has been described by Prof. Robert T. Livingston in the preceding Progress Report.[2] He recognized already the principal problem areas which would dominate the decade of the 1950's though, not surprisingly, he tended to overestimate the progress to be expected during that period. However, he did not mention the term "management science" which, thus, can be truly called a brainchild of the past decade.

Two developments appear to have contributed particularly to this new concept. One was the close attention given to the study of *managerial decision processes*. Livingston referred to them as the final step in the sequence of managerial evolution. It seems that a major impetus arose from the ever-growing need for managers with a "generalist" outlook. Development of formal training methods led to an analysis of the factors contributing to decision-making in order to design suitable techniques for improving this essential activity.

The other cause arose from a completely different angle. *Operational research* techniques had proved their value for the solution of military problems during the war. Those trained in this field now attempted to apply these techniques to the areas of managerial decision-making. Thus the concepts of the "scientific method" of the physical sciences based on quantitative mathematical analysis invaded the domain of management. Professor Livingston noted the beginnings of this new trend and discussed some of the types of problems particularly adapted to its application.

It will be seen that the new science bears the traces of its diverse ancestors and has not yet been able to merge them into a unified body. Critics of its present shortcomings should keep these difficulties in mind which time is bound to remedy eventually.

Conceptual Problems of Management Science

Management science, as indicated before, is not yet an established branch of science. Its aims and purposes can easily be described in broad terms but an agreed definition, which is an indispensable prerequisite of an established field, is not yet available. Of course, there are reasons for this situation.

First of all, those interested in management science have approached it from some other area of research they were engaged in. Their peculiar background could not help but influence their opinion regarding the scope, objectives, and methods of the new science.

Also there has been the apparent need to emphasize the practical applications to convince business executives of their usefulness for management purposes. This has led to a concentration of attention to results at the expense of research on fundamentals as can be readily seen from a survey of the current literature. However, this situation is not restricted to management science by any means. Frequent complaints have been voiced about overemphasis on applied (practical) research as compared with theoretical (fundamental) research.

Obviously, it is difficult to present a well-rounded picture of the concept of management science at the present stage of its evolution. The best possible solution appears to be to discuss some of the principal points of view which have been suggested during the past decade rather than attempt a composite which would reflect the position of a particular individual.

1 The importance of the problems of *organization* in management has led to recommendations to make them the principal subject matter of management science; it should concern itself mainly with the design and analysis of organizational structures. Almost equally important would be an attempt toward aligning the needs of both individuals and business organizations. Economic-profit objectives would have to be reconciled with social responsibilities. The best interests of business would require a wide extension of individual opportunities within the enterprise. This point of view is distinctly reflected in the following passage: "The modern science of managing is the application of ethical principles by qualified professional managers to the problems of creating and maintaining complex patterns of order which serves, in optimum fashion, the common interest of the people."[3]

2 Closely related to this approach is that of business as a

[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

[2] R. T. Livingston, "The Theory of Organization and Management," Ten Years' Progress in Management, 1942–1952, TRANS. ASME, vol. 75, 1953, pp. 655–660.

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[3] H. F. Smiddy and Lionel Naum, "Evolution of a Science of 'Managing' in America," *Management Science*, October, 1954.

system whose parts are "human beings contributing voluntarily of their knowledge, skill, and dedication to a joint venture."[4] An important aspect of such a system is interdependence. According to Drucker, what matters is the performance of the whole rather than primary emphasis on the efficiency of individual parts as has been common in management science.[5]

The business system as subject matter of management science is different from any system of the physical sciences. It is a system of people and ideas; its purpose is to describe the behavior of people. While they are components of the system, they cannot be studied as in Hurni's view "depersonalized elements but live within and outside the system." Their actions or even lack of them affect the design and performance of the system.[6]

3 On the other hand, there is no fundamental distinction between humans and other phenomena in the outside world as far as the student of the physical sciences is concerned. All these phenomena are assumed to be subject to the same basic principles of research as represented in the "scientific method" with its emphasis on quantitative analysis. The concept of science as such is limited to those criteria as can be fitted into this rigorous framework. There is no science beyond its boundaries.

Operations-research scientists recognize one definition of science based on the scientific method and quantitative analysis. Management science would have to meet those entrance requirements or expect rejection of its application for admission as a science. Now the objective is to "adapt existing scientific knowledge and the techniques of the scientist for the solution of the problems of management."[7] Although the profession of management has aided industrial progress, nevertheless, "the choicest management principles to be found in the management literature are generally referred to as clichés by the scientist who sees in them neither operationally verifiable meaning nor evidence of established generality of applicability."[7] Progress in scientific management consists in "the creation and development of a sequence of new professional groups, each specializing in techniques for handling an old management problem in a new manner grounded in a central concept of basic scientific validity."[7] This approach which is so natural to the thinking of the physical scientists has had a strong impact on the evolving concept of management science and, at times, it appeared as if it would become the dominating one.

4 These strongly antagonistic positions led to attempts toward a *reconciliation*. Then management science would be primarily science and thus differ from scientific management with its emphasis on the practical aspects of management. Although developed largely by scientists, it needs help and guidance from practitioners of management. Management science has to be looked upon as a new subscience of sociology, as "that part of sociology which pertains to the formulation, systemization or classification of knowledge about the conduct or administration of a social group enterprise conducted for a purpose."[8] In this manner, "management science includes the physical sciences related to the conduct of the group enterprise and the social sciences related to the people associated in the group enterprise."[8]

[4] K. E. Boulding, "General Systems Theory," *Management Science*, April, 1956.

[5] P. F. Drucker, "Thinking Ahead," *Harvard Business Review*, January, 1959.

[6] M. L. Hurni, "Characteristics of Management Science," a talk before New York Chapter, Institute of Management Sciences, June, 1959.

[7] M. M. Flood, "The Objectives of TIMS," *Management Science*, January, 1956.

[8] G. H. Symonds, "The Institute of Management Sciences: A Progress Report," *Management Science*, January, 1957.

Critical Comments

1 Strong objections were directed against the tendency of indiscriminate use of the *scientific method* as applied in the physical sciences. In fact, this is an old problem going back to the "methodological struggle" of the late nineteenth century. The true cause of the argument is the human being himself. While a mere object in the natural sciences, he dominates the social sciences. He can adjust himself almost instantaneously to changes in his social environment. This has a strong effect on the possibilities of predicting future events which is fundamental to the scientific method.

2 Another argument centers around the exclusive concentration on *quantitative data*. The scientific method, as interpreted by natural scientists, will not consider data which cannot be expressed in quantitative terms. Yet many important business data are of this type, particularly those related to human behavior. Often arbitrary techniques are used to convert nonquantitative data into quantitative ones to make them qualify under the scientific method. It appears that the problem of how to use nonquantitative data in management science is an important one; but little attention has been given to its solution while all efforts were concentrated to develop quantitative data even in situations when this cannot be accomplished satisfactorily.[9]

3 Lack of a *theory* of management science has been strongly criticized by some observers. It has started with "concepts and tools developed by other disciplines for their own particular purposes" instead of following the path of those disciplines in first defining their subject matter and only then proceeding toward the development of their own concepts and tools.[10] The focus has not been on fundamental questions rather than on "Where can I apply my beautiful gimmick?"[10] The two primary needs of a management science would be first "that it respects itself sufficiently as a distinct and genuine discipline" and second "that it takes its subject matter seriously."[10]

4 Applicability of *mathematical models* to the solution of management problems will be discussed in a subsequent section on operations research.

5 The use of the concepts of *statistical probability* for managerial decision making will also be taken up later on.

Summary. Our discussion has assumed a dominant position for management science in the sense that its task would be to serve as a co-ordinating agency for all the other sciences and techniques connected with or interested in problems of managerial decision-making. However, this point of view is not generally accepted by any means. It is opposed primarily by the promoters of operations research. This is much more than a mere difference in terminology; it reflects a distinction on fundamentals, for operations research concentrates on the application of the scientific method as understood by physical scientists. To give it the top position would mean agreement to this specific approach of management science. However, its future seems to be in the direction of the broadest possible approach, leaving the door wide open to a variety of methods existing or to be developed.

Operations Research

The most important application of the concepts of the scientific method on problems of managerial decision-making during the past decade has certainly been operations research. It started as an independent field and, as mentioned before, those promoting it generally want to keep it that way.

[9] E. H. Weinwurm, "Limitations of the Scientific Method in Management Science," *Management Science*, April, 1957; also, "Measuring Non-Quantitative Data in Management Science," talk before the Institute of Management Sciences, October, 1957.

[10] P. F. Drucker, op. cit.

"Operations research in the most general sense can be characterized as the application of scientific methods, techniques and tools to problems involving the operations of systems so as to provide those in control of the operations with optimum solutions of the problems."[11] This very broad definition by the authors of a highly regarded reference work includes both managerial and nonmanagerial (especially military) applications. The emphasis is on two concepts, namely, the scientific method and the optimum solution. The implication is to realize them through the use of mathematical techniques which dominate the field in accordance with the background and preferences of its leaders.

The concept of optimization ties in with some of these mathematical techniques. It may be considered the most significant contribution of operations research to managerial decision-making. Another frequently mentioned concept is that of a team approach. Operations-research workers prefer to operate as a team consisting of experts with different backgrounds, all of whom, however, are devoted to the language of mathematics as a common means of communication.

Operations research in its business applications has been concerned with the design of mathematical models and their manipulation toward an optimum solution of the problems under review. This approach has had a strong appeal for business executives striving toward maximization of profits.

The introduction of the concepts of scientific research to the analysis of management problems has been beneficial in many ways. It has brought to the decision-making processes of business executives a background of detailed and meticulous investigation never used before. This, in turn, has had valuable effects on the over-all analytical techniques of business.

Another significant result has been the discovery that many business problems, which appear to be widely different, in fact can be reduced to a comparatively small number of basic models. This, undoubtedly, represents an important step toward the determination of fundamental relationships and classifications which are an essential prerequisite for the development of a science of management. Continuing work in this area should make very significant contributions to the problems of managerial decision-making.

However, as may be expected, considerable difficulties developed from the invasion of business by operations-research workers and their peculiar approach to the solution of business problems.

First of all, there has been a lack of mutual understanding between the mathematically oriented operations-research workers and the more pragmatic business executives. The former have no doubts about their ability to optimize business problems provided they can be exactly defined and all the required data can be made available to them. They are easily baffled by the apparent inaccuracy and indefiniteness of businessmen's concepts which, however, are the unavoidable result of uncertainties and frequent changes facing businessmen at all times.

Furthermore, adequate quantitative data to be fitted into the algebraic formulas developed by operations-research techniques are often not available; this can present a major stumbling block for their use toward solution of business problems. Many managerial considerations do not lend themselves to a determination in exact quantitative terms. A manager will be unable to use the solutions supplied by an operations-research team if he cannot substitute numerical data for the algebraic functions of the operations-research formula. The whole effort will appear to him unrealistic and lacking practical significance. More general application of operations-research techniques will require a substantial change and expansion of the procedures for developing those numerical data from accounting or statistical systems. Little has been done in this direction up to now.

There is no doubt that operations research will continue as an important factor in supporting advanced and improved methods of managerial decision-making in the years to come.

[11] C. W. Churchman, R. L. Ackoff, E. L. Arnoff, "Introduction to Operations Research," John Wiley & Sons, Inc., New York, N. Y., 1957, chapter 1.

Decision Theory and Organization Theory

The need for a thorough and detailed analysis of decision-making processes was mentioned before as a primary cause for the development of management science; this had to be done in order to make it possible to teach the proper techniques of decision-making to those who would be called upon to make those decisions. Indeed, improvement of the decision-making ability of business executives may well be called the leading objective of management science.

Attempts for improvements in this direction have been going on for a long time; but they were directed mainly toward the technical and more practical aspects of the problem. In making it a part of management science the requirements of the scientific method have to be considered.

The principal approaches to a theory of decision-making parallel those discussed earlier in connection with the analysis of the concept of management science. One is rationalistic with emphasis upon building of mathematical models; it attempts to eliminate the human factor as far as possible. The other puts the spotlight on this factor; it looks at the decision maker as an individual who is an integrated part of the business organization.

There is another interesting parallel, in this case between operations research and decision-making. The economic concept of profit maximization has been correlated with the mathematical techniques of maximization of variable functions. The concepts of mathematical probability theory have been applied to the problem of *uncertainty* in making managerial decisions. The problem has been given increasing attention in recent years. This reflects the obvious fact that business decisions are directed toward the future and, therefore, must consider the problem of uncertainty.

In this connection, the question arises once again whether a mathematical technique which has been used successfully for a variety of purposes (such as insurance, quality control, and so on) can be equally applied to the field of managerial decision-making where so many nonquantitative and ever-changing factors are involved. However, much valuable work has been done in the field of *statistical decision theory* which is based on the concepts of mathematical probability theory.

The second of the approaches to decision-making theory starts from the fact that managerial decisions are made by and addressed to humans; indeed, all business activity is primarily concerned with humans and this consideration can never be excluded whenever managerial decisions are made. Thus the efforts of those who attempt to eliminate the human aspects of decision-making cannot succeed. It is in recognition of this situation that *behavioristic and organization concepts* have been incorporated into decision theory and management science just as have been rationalistic and quantitative ones.

The organization is conceived as a group of individuals who are connected by a complex pattern of communications. Such factors as loyalty to and identification with the organization and its purposes have an important impact on its operations and thus must be taken into account by the decision maker. The same goes for the problems of communication which will be discussed in a later section.

Attempts have been made to reconcile the two extreme positions just as happened in the case of the scope of management science. Herbert A. Simon and his associates at Carnegie Institute of Technology have been leading in the development of an

integrated theory of organization. They accept the nonrationality of many decision-making processes but work toward increasing rationality to the point where the irrational factors can be reduced substantially. This trend is completely in line with the objectives of management science.

The widely accepted concept of profit maximization is subjected to critical review. While "economic man" tries to *maximize*, the more realistic "administrative man" looks for *satisfactory* results such as adequate profits, fair prices, and so on.

The increasing impact of the *"behavioral sciences"* on the theory of decision-making is a novel and significant development. It leads away from a concept of economic theory which treats the manager as a sort of "rational robot" who reacts exclusively to monetary incentives. The theory of decision-making must evaluate the nonrational factors; their analysis may contribute to the development of nonquantitative data which are so important to the decision maker.

Related Techniques

A number of older and new techniques contribute to the accomplishment of the purposes of operations research and managerial decision-making. Space does not permit any detailed discussion of these techniques and the new problems which have arisen from their introduction.

Linear programming is being used widely for the solution of optimization problems particularly those involving large numbers of interrelated variables which are subject to certain restraining conditions and are represented by systems of simultaneous equations or inequations. Iterative techniques have been designed for solving the systems of equations and for selecting an optimum solution in terms of a given objective which must be expressed as a linear function.

Availability of electronic computers which can perform tremendous numbers of high-speed computations has been instrumental in the use of linear-programming applications to business problems. The "simplex technique" of George Dantzig has been particularly successful in this context.

A variety of managerial problems has been analyzed through the techniques of constructing mathematical models which then are being optimized by linear-programming devices. They include the transportation model, warehousing model, traveling-salesmen model, production-scheduling models, and others. Recently models of financial problems have been designed.[12]

Attention needs to be called to the limitations of linear-programming techniques for the solution of managerial decision problems. Use of mathematical symbols and procedures does not by itself furnish proof for the correctness of the solutions derived. What really matters is the correctness of the premises from which the conclusions were drawn. Mathematical solutions will provide management with useful information only to the extent that the premises and other data of the mathematical models have been correct and accurate.

These mathematical models have the advantage of ability to be manipulated readily for the purpose of exploring and testing probable effects of alternative plans and policies. However, their significance and applicability for the solutions of particular business decision problems cannot be taken for granted but must be evaluated carefully in each particular instance.

The function to be optimized in the case of business decisions is commonly assumed to be *profit maximization*. However, the applicability of this model of classical economic theory is less valid than is assumed by operations-research workers. Decision makers have to evaluate other factors which were not included in the mathematical model. Therefore the solutions derived from linear-programming techniques are just one, though often a most important, factor in reaching managerial decisions.

Waiting-time problems appear in a wide variety of forms in connection with business decisions. They are concerned with the design of suitable arrangements for providing services of many kinds in the most effective and yet most economical manner.

Waiting lines (*queues*) occur before service or check-out counters, tellers' windows, toll stations, and so on, under circumstances when demand for such services cannot be anticipated or regulated readily. Then the problem is to minimize the cost of providing an amount of service facilities which should be sufficient to avoid a waiting time beyond a reasonable and/or acceptable period.

Another situation develops if the amount of service facilities is fixed and cannot be expanded. Then it will be necessary to *schedule* or sequence the arrival time of those requiring service to keep both cost and waiting time at a minimum. Problems of scheduling manufacturing operations for a given number of available machines are typical for this sort of application. It also involves the appointment secretary of a busy executive or professional consultant.

Monte Carlo Method. Applications of the theory of mathematical probability are frequently used for the solution of operations research problems. This is particularly so in cases when it is difficult or impractical to accumulate all necessary data; also under conditions when physical experiments cannot be made and no exact formula can be developed.

Game theory is an especially sophisticated application of probability concepts. Its mathematical models represent the behavior of players in a game in order to analyze all of their moves and, eventually, to determine optimum strategies. Each player has to make decisions which are based on a very limited knowledge of his partner's position. The outcome of the game depends partly on chance but also on the actions of the players and their expectations of each other player's present and future actions.

The mathematical solution will tell each player how to behave in all conceivable circumstances in order to attain a maximum advantage. Many business situations are virtually identical with those faced by the players in a "game of strategy." Frequently the decision maker has to evaluate the effects of his actions upon the decisions of his competitors.

The results of extensive research in the field of game strategy have been limited due to the tremendous mathematical problems involved. But the importance of these efforts for the improvement of managerial decision-making needs no special emphasis. Already business applications have been made in some areas such as evaluation and distribution of advertising expenditures, problems of competitive bidding and pricing, and others.

Simulation. Mathematical models, in fact, simulate the activities which are reflected in the model; thus simulation has been widely used in connection with operations research problems. However, it is not a new device by any means; many business-planning activities can be classified as simulation. A special application of simulation techniques is *business games* which combine concepts of mathematical models with those of game theory. In many cases, players in the game compete for limited facilities such as markets, funds, or productive resources. The games permit covering periods of several years within a few hours and provide the players with the results of their decision-making. Thus they are excellent training devices for higher levels of management.

Information Theory

The trend toward expansion and, at the same time, decentralization which characterizes the modern business organization has

[12] A. Charnes, W. W. Cooper, and M. H. Miller, "Application of Linear Programming to Financial Budgeting and the Costing of Funds," *The Journal of Business*, January, 1959 (with a comprehensive bibliography of other applications).

put the spotlight on the problems of intracompany communication and control. The larger the organization, the more complex but also the more vital is a satisfactory solution of these problems for successful operation and managerial decision-making.

Applications of scientific techniques by management depend on adequate and up-to-date information and effective control of all the parts of the organization. Moreover, the ever-increasing volume of data and reports which management is expected to digest makes an appropriate selection process virtually essential.

The concept of a general theory of information to be applicable on all types of organizations, living bodies as well as electrical communication networks, is a recent development. The flow of information would "feed back" data from the field to headquarters which would be enabled to issue timely directives and control compliance as well. The need for optimum utilization of communication networks led to an analysis of the volume of data transmitted in comparison with that actually required to put a message across to the recipient; reduction of the volume of data transmitted would provide facilities for increased use of existing channels. The new theory of "cybernetics," first suggested by Norbert Wiener, famous mathematician from Massachusetts Institute of Technology, has been devoted to an exploration of the manifold problems evolving from those basic concepts.

The impact of this new science on management should be profound. There has never been a scientific-type analysis of the kind and volume of information which management must have for proper decision-making. Now tools will be made available for a study of these all-important problems. Great progress has been made in the use of high-speed electronic computers and the transmission of data between different locations at electronic speed to provide decision makers with a minimum but adequate volume of always current data which should greatly improve their ability to make optimum choices among alternative proposals.

Scientific Measurement of Business Data

Ability to measure is the accepted test of the scientific method. Thus the importance of satisfactory concepts and techniques of business measurements for management science needs no elaboration. While the problems of measurement in the physical sciences have been explored for a long time, this has not been the case as far as business measures are concerned. Of course, there are those who deny the need for a separate study of measurement problems in the social sciences, including business, from the point of view that there is just one set of principles for all kinds of measurements. However, the problems are not identical in the different fields as has been indicated before. The concepts of the physical sciences must be analyzed carefully to determine their applicability to the social sciences and business.

Management science uses a number of independently developed measuring techniques; those of the physical sciences, statistics, accounting, and so on. Moreover, there are the important nonquantitative data. Management needs all these techniques and the data derived from them. Each of these techniques has its own historically evolved system. Therefore the first essential task is to analyze them with a view to the emergence of a common foundation of principles which would be valid for all. There is an urgent need for a comprehensive *theory of measurements for management* which will incorporate both the common foundation as well as the peculiar problems of each system. The proper area of application of each will have to be determined. All of them will have to reflect the requirements of the scientific method in its broad interpretation which recognizes essential differences while maintaining the essential common fundamental requirements. Not much has been accomplished toward that end as yet.

Summary and Outlook

Even this brief survey will have impressed the reader with the scope and the variety of problems in this new field of management science. It incorporates many different outlooks, activities, and techniques which easily lead to an impression of a lack of coordination and integration. There are those whose primary interest is in the human element and others who concentrate on a purely quantitative and objective approach. It reaches out into novel areas whose ultimate significance cannot yet be adequately appreciated.

At this stage of development, it would be a serious mistake to take a rigid attitude and limit the boundaries of management science in one direction or another in accordance with particular preferences despite the insistent demands emanating from various quarters.

Two principal concepts, however, can be clearly distinguished:

(*a*) Management science can never lose or deny its connection with and *dependence on the scientific method* in its broad scope outlined before. Probably its most important task in the years to come will be to reorient and reorganize the various sciences and techniques which are associated with it toward the attainment of that overriding objective. This will not be easy but will have to be attempted and accomplished eventually.

(*b*) Management science will have to be always conscious of its main purpose to serve as an *effective tool of managerial decision-making*. Therefore it must concern itself with everything which can help toward attaining that goal. It cannot restrict its scope either with regard to the *type* of science or technique it will be interested in nor to those in existence at any particular *time*. As new fields develop, they will have to be included into its framework provided they meet its over-all objective.

This provides us with a working definition of management science which avoids the pitfalls of partisanship and the dangers of narrow-mindedness. The door is kept wide open for new developments.

Thus it will be the duty of management science to encourage research into new opportunities in a wide variety of fields with the only limitation that they will make a contribution to managerial decision-making and are capable of being organized in accordance with the requirements of the scientific method.

As the responsibilities of management grow in an ever more complex social environment, so will the scope and significance of management science in its many diversified aspects. Its potential for growth is tremendous and virtually unlimited. Its realization will depend on the abilities and efforts of those who will devote themselves to its exploration. Much that is hidden and cloudy today will have been clarified ten years hence.

Bibliography

This list represents only a small selection of the many books which have been published on subject matters related to management science. A Comprehensive Bibliography in Operations Research to 1957 of articles in the field has been prepared by Case Institute of Technology and distributed by John Wiley & Sons, New York, in 1958.

R. E. Bellman, "Dynamic Programming," Princeton University Press, Princeton, N. J., 1957.

C. W. Churchman, R. L. Ackoff, and E. L. Arnoff, "Introduction to Operations Research," John Wiley & Sons, Inc., New York, N. Y., 1957.

W. W. Cooper, A. Charnes, and A. Henderson, "An Introduction to Linear Programming," Wiley, 1953.

R. Dorfman, P. A. Samuelson, and R. M. Solow, "Linear Programming and Economic Analysis," McGraw-Hill Book Company, Inc., New York, N. Y., 1958.

R. D. Ferguson and L. F. Sargent, "Linear Programming," McGraw-Hill, 1958.
S. I. Gass, "Linear Programming," McGraw-Hill, 1958.
T. C. Koopmans, editor, "Activity Analysis of Production and Allocation," Wiley, 1951.
D. U. Greenwald, "Linear Programming—An Explanation of the Simplex Algorithm," Ronald Press, New York, N. Y., 1957.
J. F. McCloskey and F. N. Trefethen, "Operations Research for Management," Johns Hopkins Press, Baltimore, Md., 1954.
R. W. Metzger, "Elementary Mathematical Programming," Wiley, 1958.
O. Morgenstern, "Economic Activity Analysis," Wiley, 1954.
P. M. Morse and G. E. Kimball, "Methods of Operations Research," Technology Press of M.I.T., Cambridge, Mass., 1951.
N. Saseni, A. Yaspan, and L. Friedman, "Operations Research," Wiley, 1959.
G. H. Symonds, "Linear Programming—The Solution of Refinery Problems," Esso Standard Oil Company, New York, N. Y., 1955.
American Management Association, "Operations Research—A Basic Approach," Special Report No. 13, 1956.
American Management Association, "Operations Research Applied," Special Report No. 17, 1957.
American Management Association, "Operations Research Reconsidered," Management Report No. 10, 1958.
National Industrial Conference Board, "Operations Research," Studies in Business Policy No. 82, New York, N. Y., 1957.
R. L. Ackoff, "The Design of Social Research," University of Chicago Press, Chicago, Ill., 1953.
W. R. Ashby, "An Introduction to Cybernetics," Wiley, 1956.
F. Attneare, "Applications of Information Theory to Psychology," Holt, New York, N. Y., 1959.
St. Beer, "Control Systems," English Universities Press, London, England, 1957.
St. Beer, "Cybernetics and Management," Wiley, 1959.
L. Brillouin, "Science and Information Theory," Academic Press, New York, N. Y., 1956.
D. Blackwell and M. A. Girshick, "Theory of Games and Statistical Decisions," Wiley, 1954.
I. D. J. Bross, "Design for Decision," Macmillan & Co., New York, N. Y., 1953.
C. W. Churchman, "Theory of Experimental Inference," Macmillan, 1948.
C. W. Churchman and R. L. Ackoff, "Methods of Inquiry," Educational Publishers, St. Louis, Mo., 1950.
C. W. Churchman and Ph. Ratoosh, editors, "Measurement: Definitions and Theories," Wiley, 1959.
D. P. Davidson, P. Suppes, and S. Siegel, "Decision Making," Stanford University Press, Stanford, Calif., 1957.
S. Goldman, "Information Theory," Prentice Hall, New York, N. Y., 1953.
G. T. Guilbaud, "What Is Cybernetics?" Heinemann, London, 1959.
E. J. Gumbel, "Statistics of Extremes," Columbia University Press, New York, N. Y., 1958.
R. D. Luce and H. Raiffa, "Games and Decisions," Wiley, 1957.
H. A. Meyer, editor, "Symposium on Monte Carlo Method," Gainesville, 1954, New York, 1956, Wiley.
J. C. C. McKinsey, "Introduction to the Theory of Games," McGraw-Hill, 1952.
P. M. Marse, "Queues, Inventories and Maintenance," Wiley, 1958.
J. G. March and H. A. Simon, "Organizations," Wiley, 1958 (with an extensive bibliography).
J. von Neumann and O. Morgenstern, "Theory of Games and Economic Behavior," Princeton University Press, 1947.
F. M. Ricciardi, "Top Management Decision Simulation," American Management Association, 1957.
C. Shannon and W. Weaver, "The Mathematical Theory of Communication," University of Illinois Press, Urbana, Ill., 1949.
H. A. Simon, "Administrative Behavior," Macmillan, first edition, 1947, second edition, 1957.
H. A. Simon, "Models of Man," Wiley, 1957.
M. Shubik, "Strategy and Market Structure," Wiley, 1959.
T. E. R. Singer, "Information and Communication Practice in Industry," Reinhold, New York, N. Y., 1958.
R. M. Thrall, C. H. Coombs, and R. L. Davis, editors, "Decision Processes," Wiley, 1954.
S. Vajda, "The Theory of Games and Linear Programming," Wiley, 1956.
Norbert Wiener, "Cybernetics," Wiley, 1949.
J. D. Williams, "The Compleat Strategyst," McGraw-Hill, 1954.

DISCUSSION

M. L. Hurni[13]

In reporting on developments in Management Science during the past decade, Professor Weinwurm quite correctly places emphasis upon the conceptual difficulties involved in the idea of Management Science. Work during the past decade has pointed up a variety of opportunities and an equal number of dilemmas.

As yet there is no unifying philosophy. Neither the subject matter, which is "A Business," nor the "Purpose of a Science" addressed to this subject is yet understood. The fact that it is possible to state many of the conflicting beliefs of the several "Schools" of Management Science, as Professor Weinwurm has done, is a heartening sign, however.

A major endeavor for this next decade will likely be to establish a set of beliefs about the nature of "A Business" that will make it possible to use the methods of the several schools as a single, harmonious discipline. This will not be an endeavor at reconciliation among the beliefs as they exist today, but one of determining a set that is more all-embracing than those currently held by any or all of these "Schools."

Speculating on this possible new set of beliefs, it is instructive to note that each business enterprise is in many respects like a small world of its own. The purposes of such an enterprise, the objectives, the means for achievement, even the evaluation of achievement is based upon the beliefs, assumptions, and the satisfactions desired by those people within that business enterprise.

It is not readily apparent that there is an all-pervading and absolute objective, such as, for example, profit maximation or a single, immutable process for achievement based for one example on the use of historical probability distributions, important as both of these concepts and related methods are. The opportunities seem infinitely more varied than these.

One example may suffice to illustrate. In a particular industry one Business Enterprise may achieve to be the largest producer, another may seek to be the leader in profit. Still others may seek to provide highest quality, or to be the innovators, and others still may attempt to do all of these things.

Each such approach is based upon a set of beliefs about the environment in which the small world of a Business Enterprise exists. What seems success for one, may be a source of dissatisfaction and failure for another.

Each such Business Enterprise in itself appears to be a closed system. On the one hand, it is closed on a set of beliefs about the world outside the system and, on the other, by the realization or lack of realization of expected results. The enterprise may perish for a lack of realistic beliefs, because of inability of people within the enterprise to change their beliefs, for lack of effective joint performance consistent with these beliefs, or all three. It may also perish for lack of appropriate satisfaction for its people.

It thus seems likely a unifying philosophy may be found in a realization that Management Science is a science of relatives rather than of absolutes; that its purpose is to make explicit beliefs held, to demonstrate consistency of inconsistency among such beliefs, to provide means for describing processes of joint performance so that they may be evaluated and understood by people who are participating in a joint venture.

In short, the science may well be directed toward aiding men in

[13] General Electric Company, Schenectady, N. Y.

forming a better estimate of their position, rather than having as its objective the search for universal truth.

D. G. Malcolm[14]

Professor Weinwurm has undertaken a difficult task in attempting to put the "new" field of Management Science in proper perspective. Without knowledge of the other papers comprising the report, "Ten Years' Progress in Management, 1950–1960," it is difficult to appraise whether the following remarks should be directed toward this paper or toward the scope and organization of the report itself. In either event, the relation and contribution of engineering—in particular, industrial engineering—to the management process, and hence management science, are significantly missing in his paper. This discussion is directed only to this aspect of the paper.

Management Systems and the Decision Process. Managerial approaches are in a continuous state of change. Industrial Engineering has played a major role in the design of systems by which management obtains a measure of control over the operations and the enterprise. Management Control Systems and Management Information Systems are perhaps the major ways in which communications are made in an organization. Properly designed, they provide a consistent, systematic method for aligning all the elements of an organization toward goals set for the organization. It is beyond the scope of this discussion to describe the volume of work done and underway in "designing" new, more comprehensive, and automated systems to aid in the management function. This work is particularly significant in the area of planning and controlling research and development activity.[15] It is sufficient to say that "management-by-system" is an accepted and growing approach, one dedicated to improving efficiency of the organization and the management process.

Thus management systems are a central element in the "decision-making process" whose thorough and detailed analysis Weinwurm describes as "a primary cause for the development of management science." Determining the level to which "automated decision-making" should be or can be made is an important problem in management and management science. Management science cannot, and indeed does not, ignore the dynamic nature of the process it is both studying and trying to influence. The role of management science is doubly difficult since the environment and process are changing so swiftly that meaningful research is hard to conduct. Further, it may well be argued that it is fallacious to assume that management has any interest in the scientific validity of the solutions to a particular problem. Reaction to this point of view forces the management scientist to become involved in the operational aspects of his recommendations.

The Engineering Approach to Management. The engineer has not generally looked for generalized solutions to the problems of management, but rather has attempted to get agreement on a problem, the objectives to be achieved, and the nature of an acceptable solution. In short, the engineer has proceeded to design and develop systems in a pragmatic, operational manner. That is, the systems have had to be conceived, sold, designed, installed, and operated effectively. While often suboptimal and not rigorously evaluated, these systems have produced results (at least change) and the approach represents a significant effort contributing to the dynamics of the management function.

Electrical Engineers and Industrial Engineers are both occupied in this area with the modern industrial engineering profession, some 60,000 in number, officially defined by the American Institute of Industrial Engineers as follows:

> "Industrial Engineering is concerned with the design, improvement, and installation of integrated systems of men, materials and equipment; drawing upon specialized knowledge and skill in the mathematical, physical, and social sciences together with the principles and methods of engineering analysis and design, to specify, predict, and evaluate the results to be obtained from such systems."

These professions and their journals represent a significant determinant of the management rationale extant in our economy.

The Relation of Science, Engineering and Management. Davidson[16] develops a relationship between Science, Engineering, and Management which may be summed up in the following table:

Function	Type of activity	Speed required of output activity
Science	Research, experimentation, generalization	No deadlines, long
Engineering	Design, experiment, develop, test, install	Scheduled, intermediate
Management	Operation decision making	Immediate

The interrelatedness of these functions is pointed out by Davidson; his treatment of the "function of engineering" being enlightening at this point:

> "The function of engineering is the design or planning for solutions of particular problems. The rules which prescribe appropriate engineering behavior are markedly different from those of science. The difference is much greater than it seems to be in the popular, but erroneous, conception of engineering following along in the footsteps of scientific advances. In reality, the reverse is more often true. The accomplished engineering fact provides a powerful stimulus to scientific inquiry. James Watt's engines were already a commercial product and their designer was dead when Carnot formulated the beginnings of heat engine theory.
>
> "Engineering does not defer its progress until the ground ahead has been fully prepared by scientific inquiry. It moves whenever there is a practical need and when technical insight suggests that the chance of success is sufficiently good."

Thus "management science" may also be looked on as one part of an over-all process: "Science-Engineering-Management." Viewed in this light, the management scientist must consider the impact of engineering inputs on the management process—past, present, and future—in order to effectively achieve its "leading objective": the "improvement of the decision-making ability of business executives."

Author's Closure

It was equally surprising and satisfactory to me that the comments on my analysis of Management Science were constructive rather than critical. Both Mr. Hurni and Mr. Malcolm have implemented my discussion in different ways and thus have contributed to a better understanding of the difficult issues at stake.

Significantly enough, both have emphasized the systems concept in connection with management science. In accordance with the position taken by his company, Mr. Hurni has concentrated on the organizational and human aspects of the business enterprise as a separate, closed system, while Mr. Malcolm's interest is mainly in the technical field and the possibilities of "automated" decision making which was recently brought into the spotlight by Herbert A. Simon.

I have stressed the need for broadmindedness in defining the

[14] Vice President—Western Division, Operations Research Incorporated, Santa Monica, Calif.

[15] "Management Control Systems," Report of a Symposium, 1959, John Wiley & Sons, Inc., New York, N. Y., 1960.

[16] H. O. Davidson, "The Management, Engineering and Scientific Functions," *The Journal of Industrial Engineering*, vol. XI, no. 2, March-April, 1960.

scope and contents of management science and this viewpoint is fully borne out by the comments. Management science must be capable of incorporating and integrating all the various aims of the business referred to by Mr. Hurni without showing a preference for any one of these.

Mr. Malcolm himself indicates that the industrial engineer has traditionally taken a limited attitude in relation to the larger decision-making activities of management. This fact was recently mentioned by another writer as the main cause why industrial engineering has taken a sort of back seat as an adviser to top management. Increased interest in the tasks of management science should help the industrial engineer to remedy this situation.

The commentators should be thanked for their valuable assistance toward a clarification of the goals of management science which was the purpose of my paper.

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International Progress in Management[1]

Foreword

SCIENTIFIC MANAGEMENT assisted many a government in controlling national economy under the emergency of World War II. The period 1950–1960 was the period of restoration of peace-time economy. It was significant for this period that in the free world a strong trend toward a reduced government control of economy was prevailing and instead the evolution of scientific management development schemes in virtually every country produced a more democratic structure of economy.

"True Scientific Management requires a mental revolution on the parts both of management and workers. It is safe to say, that no system or scheme of management should be considered as Scientific Management which does not in the long run give satisfaction to both employer and employee, which does not make it apparent that their best interests are mutual, and which does not bring about such thorough and hearty co-operation that they can pull together instead of apart.

"Management must be skilled in aiding workers to understand the purpose and the meaning of Scientific Management and in maintaining their confidence in the purpose and in the management." FREDERICK WINSLOW TAYLOR.

Introduction

The title of this paper contains three assumptions. Let's see whether they are justified for the period under consideration? These assumptions are:

1 There is a clear definition of the term "management."
2 There is an "international nature of management."
3 There was possibly some progress.

What is "management?" Is it
1 An art?
2 A science?
3 A profession?
4 A class?
5 A function?
6 The counterpart to trade unions in collective bargaining?

Rolf Nordling of France has defined "management" in a paper presented to the CIOS Twelfth World Congress in Australia, February, 1960:

"Management is the science and the art of employing material means and directing and controlling the action of men whose functions are different and specialized but who co-operate within the same enterprise (or organization) for the purpose of attaining a common objective."

For further clarification of the scientific nature of management one should keep in mind that:

Management decisions have to be taken on the basis of thorough knowledge of as many elements involved in the action to be taken as possible. Management has to keep in mind, though, that in every decision there are elements and interrelations which are little or unknown. Management has to make the decision nevertheless—by using intuition and courage to take the responsibility for the human and financial consequences of the decision.

A definition of the "purpose and meaning of management" (Taylor) might read as follows:

1 To produce and to offer a specific product or range of products or services at a competitive price to the market.

2 To offer employment to people who cannot make their living in a free profession or on their own land, so that they can earn a wage or salary, which allows them to take care themselves of their human needs.

3 To build up employer-employee relations based on the freedom of the individual.

4 To practice within reasonable limits the responsibility for job security of the employees.

5 To make a profit in order to:

(*a*) Keep the company technologically and in product development up to date.

(*b*) Pay taxes to the government.

(*c*) Pay dividends to the people who contributed to the capital of the company.

These definitions reflect what the author found as the common denominator of advanced management in many countries of the world.

This definition applies to a certain extent even to totalitarian communist management of the economy of a whole nation. This is no surprise, since Dr. Harlow S. Person published a "Survey of the Fields of Action of Scientific Management" at the World Social Economic Congress, 1931, in The Hague. Within his paper "Principles and Practices of Scientific Management," he pointed to the fact that up to 1931 "Scientific Management has not yet been utilized for the Stabilization of Economy on a national or international level. Experiments," he said, "have been made, but they have not been free from experiments in other fields of social organization." The nature of management in the quoted "Experiment" and its differences as compared with scientific management are apparent to the student using deductive methods of thought.

Considering the wide applicability of afore-mentioned definition, surely management has an international nature and in consequence its evolution or progress can be studied. The "CIOS Research Project" by John Shallenberger, on which he reported before the CIOS Twelfth World Congress, 1960, in Australia, disclosed most fascinating results as to the widespread nature of the management movement.

In answering the third question, "Has progress been made in the decade 1950–1960 toward an improvement of management philosophy, principles, methods, and practices as measured against the background of our definitions?" we will study management practices in the first place. Before we dare to answer such a complex question, we will see what problems management internationally had to face at the beginning of the period.

[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

Contributed by the Management Division and presented at the Winter Annual Meeting, New York, N. Y., November 27–December 2, 1960, of THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Manuscript received at ASME Headquarters, July 26, 1960. Paper No. 60—WA-68.

The Situation of Management in 1950

During the period of 1945–1950 management was mainly concerned with overcoming government controlled economical war organization and with restoring free peace-time economy. In some countries particularly affected by World War II, restoration of destroyed production facilities and interrupted international business links had to be reconstructed. Management was occupied with internal and national urgent tasks.

The American Initiative

It was the understanding for the common objective of the western world that made Americans take the first initiative for an organization and co-ordination of western national economies and development of better management by setting up international bodies such as OEEC and GATT, by opening its doors to management teams from all over the world, and by sending teams of management teachers and consultants to war beaten "developed countries" as well as to "development countries and areas" at the same time.

The understanding was that "the world needed more competent managers" (CIOS Tenth World Congress, 1954, in São Paulo) if it was expected to preserve the freedom of entrepreneurial initiative and to gain the full advantage of the freely contributed energy of the maximum number of people directed toward the common objective. The initiative of as many managers as possible had to be paralleled by the development of the maximum participation of employees in working for the common objective. The slogan for these joint effects of both management, labor, and government "productivity" rapidly spread around the world. Its meaning was that in every human activity the ratio between output and input of human energy, material means, and capital investment should be increased by the application of better working methods including better "human relations." The latter was included because one of the most serious losses of energies is due to poor relations between men working side by side in one organization. Poor human relations are partly due to group attitudes, partly due to individual reactions. Group attitudes may be due to religious, racial, political, professional, regional, and other characteristics and in consequence vary considerably between various groups and countries. On the other hand, individual reactions are caused to a great extent by basic human nature and in consequence vary little from country to country. It is not easy for the manager to distinguish between the group elements and the individual elements in dealing with an individual. This applies in particular to lesser industrialized countries where human nature has not yet adjusted to industrial needs.

Individual managers, management teams, and union members visited the United States by the thousands in the 1950's, studying American management in industry, distribution, banking, agriculture, shipping, government administration, and the universities. The latter held a large number of diversified management courses. Many international visitors experienced on this occasion to what extent management is a "body of knowledge" which is teachable and learnable—whereas in their home countries the general feeling was, that "managers must be born—cannot be made!" Their observations in the United States persuaded them that a great many methods and principles can be learned both by exchange of experience and by scientific studies and that the development of management successors should be their number one problem.

As a consequence of these visits management development institutes were established in many countries of the western world at around 1950 and after, some specialized institutes such as Henley-on-Thames, Centre d'Etudes Industrielles at Geneva, CPA in Paris, Baden-Badener Gespräche in Germany, and many others. Others were set up as extensions of existing institutions which specialized in other fields of learning. Universities began to pay more attention to economics, sociology, psychology, physiology, statistics, and so on, but generally hesitated to incorporate into their curricula "Management" as a body of scientific learning as such.

Management as a Body of Knowledge

It must be said, that medicine, mathematics, physics, and other sciences have their more or less standard body of knowledge and learning methods. No such thing exists for "Management"—which rightly is called "a science and an art" thus being designated as a complex subject. Many efforts have been made to establish it as a science and, in the long run, a system of basic elements of management might be defined which then would form the "body of knowledge and learning" of management. A tentative list of management training subjects has been published with the paper presented by Prof. Dr. Hans F. Schwenkhagen at the CIOS Eleventh World Congress, 1957, in Paris, as a basis for discussion. No doubt the knowledge on this complex subject has been considerably increased in the 1950's. Ever-widening fields of management have been studied, and principles and methods have been defined. It is understood that, at the end of the past decade, management is one over-all activity directing, leading, and controlling every function and phase in an organization. It is remarkable to note that within 50 years "the art and science of management" evolved from a mere study and improvement of the work of the productive worker in the shop to virtually every business activity within an organization—whether industrial or not—within the nation and even on the international level. The CIOS Twelfth World Congress, 1960, in Australia, represented this over-all and world-wide nature of management by its program. This program ranged from "Work Study and Work Simplification" to "Management of Research," to "Management of Governments," to "Keeping Raw Material Prices Stable," and to "Provision, Accumulation and Management of Capital in a Developing Country."

Non-American Management Development Institutes in the beginning invited mostly American experts to be lecturers in the seminars, but later on they included more and more nationals as teachers who frequently had gone through American courses or had received their training in the courses of the institute and who were particularly familiar with the national technological and human problems. It proved to be of particular value to invite top-management practitioners as lecturers and discussion leaders into such seminars. Both lecturers and participants gained by such seminars in the round-table discussions, on a specific subject. Many top managers found they gained themselves by being invited to speak on their own principles and methods in management not only on the "what" they did but rather on the "why" and the "how."

Productivity Movement

Governments of many countries took an interest in the American efforts to help countries to help themselves by increasing their productivity by setting up "Productivity Centers." These centers were based on the co-operation of management, labor, and government. Their objective was the promotion of productivity by utilizing national and international (Marshall Aid, and so on) funds. On the European level "European Productivity Agency" (EPA) as a section of the "Organization of European Economic Co-operation" (OEEC) was set up. EPA operates as a clearing house and a center of national productivity centers in the promotion of productivity within the 18 OEEC member countries. It is difficult to measure results of such international

bodies on a field as complex as productivity. Development of management experts and trade-union *functionaires* as well as agricultural experts in the field of productivity and modern management methods for the increase of productivity has been successful. The two social-economic-political concepts Europe has been faced with ever since 1918 may have reduced its effects in the field on joint management-labor programs.

The Great Alternative

The alternative between these two concepts not only divides the areas East and West of the Iron Curtain, it reduces the effectiveness of co-operation between many groups in western Europe to a certain extent as well. One concept is that of free trade and free enterprise, based on the freedom of the individual no matter whether employer or employee. The other concept desires dirigisme[2] or public control of economic (industrial, and so on) activities and ultimately socialization. These oversimplified definitions of the alternatives should just designate the extremes. Actually no pure extremes do exist in any western country. In practice no government can do without some sort of planning and control in the economic field, in the fiscal field in particular. On the other hand, good management within an enterprise has to apply a good portion of dirigisme and by the nature of functional subdivision of work within the organization has to expect the individual employee to submit his free decisions to the laid down policy of the organization. It goes beyond the framework of this paper to analyze the complexity of this alternative and the variety of solutions existing. Such an analysis is important though for the manager studying economical-social-political trends in various parts of the world, in particular in the development areas.

Management and the Community

Management in the developed countries has increasingly realized its social responsibility within the community and the nation. In the lesser industrialized countries it seems to take more time to make management understand this responsibility toward the consumer, the employee, and the government. With legislation and consumer demand changing at an ever-increasing pace, management has to realize that it is not alone and free to do whatever it likes. On the contrary, it understands that an organization or enterprise is but part of national economy and that management is a kind of trusteeship over this part, which is interwoven with many other parts. Management does further understand that in a democratic country it will never play a quantitative role, it can only play a qualitative role in the public. This requires management expressing its views in public. Managers expressing their views in a clear, understandable, thought-provoking, realistic, and ethical way in public meet with understanding, since the public expects true leadership by management.

Complex Meaning of "Manager" and "Management"

For an international observer it is a bit confusing to realize the complex meaning of the two terms in the English language. In non-English languages special terms are used to express some of the different meanings. In French for instance *gestion, direction, organisation,* and *administration* cover part of the meanings of *management.* In Germany *Betriebsführung, Direktion, Verwaltung, Leitung, Unternehmensleitung* are in use. Even in English the question remains open for discussion whether management is

1 An art?
2 A science?
3 A profession?
4 A class?
5 A function?
6 A counterpart to the trade unions in collective bargaining?

Are union activities within an enterprise in particular in connection with *codetermination* (*Mitbestimmungsrecht*) and other types of active participation in the decision-making on various activities of the enterprise to be considered as an integral part of management? United Kingdom, Holland, Belgium, Germany, and others can contribute some interesting experiences. These schemes prove to offer useful means—if properly handled by management—to build employee understanding for the common objective within the organization (as proposed by Taylor).

Similar distinction can be made between various meanings of the term "manager." Is a manager—

1 An owner or the shareholder of a company?
2 An owner-manager (French: *patron;* German: *selbständiger Unternehmer*)?
3 A manager in a private or limited company?
4 A manager in publicly controlled company?
5 A manager in a socialized company (in communist countries)?
6 A promoter of a boxing champion?
7 A member of a "board of directors" (German: *Aufsichtsrat*)?

It would be helpful for the international acceptance of "management as a profession" to clarify these questions. A study of the professional attitude of these seven kinds of managers might disclose distinct differences as reflected in the different words for the various kinds of managers in other languages.

Having discussed the situation management internationally found itself in at the beginning of the decade and some of the more general aspects of management during the decade we now will consider the progress that has been made during the decade more in detail, classified by the ten management functions.

Management Functions—Progress

Business Policy, Organization, and Management Development. This function has been understood to be a specific top-management function. Long-term business policy has to be decided based on careful studies and to be adjusted to circumstances as execution of the policy draws nearer. Equally important is setting up the organization of the company (centralized, decentralized, and so forth) and the training and appointment of qualified persons to each management position within the organization. In training management successors it was found that no clear distinction was made between top, upper, middle, and lower management. A German group (the "*Wuppertaler Kreis*") introduced a clear definition which, meanwhile, has proved to be a useful tool for the proper selection of lecturers, participants, subjects, and methods for management-development courses for the various management levels.

Research and Development. This management function gained acceptance throughout the world in the 1950's in virtually every field of industrial and administrative activity. Basic research work is mainly concentrated in universities and larger industrial organizations. Methods research and applied research are increasingly considered the basis for future progress in the development of products and working methods even in smaller organizations. Some companies spend as much as 5 to 10 per cent of their sales returns on research and development. The development and application of standard products and parts under pressure from the market demand is considerably lagging behind the development of technology in many countries.

[2] Dirigisme defined as public control of economic activities and ultimately socialization, more in particular government control toward the goal of an otherwise free economy.

Planning. This function was proposed by Taylor for production only 60 years ago. Now it has been accepted as the basis for every successful management activity. Operations research developed into a good fact finder for planning in the 1950's and began to find increasing application in many countries.

Production. Technology made rapid progress during World War II. Automation was the new slogan for rapid progress in the 1950's. With the assistance of quality control it is now developing into computer-controlled automation wherever mass-production problems (even with a certain degree of variety of products) have to be solved. It is understood that prerequisites for mass production are standardization and suitable marketing methods. These methods demand heavy capital investment and they are the only means of coping with the pressure for increased employee compensation and the increasing labor shortage without equally increased production, administration, and distribution costs.

Purchasing. In a buyers' market this is not an important function in production. But in distribution it developed in many countries into an important factor as indicated by the growing number of purchasing chains of retailers. In this field market research, operations research, material handling, and computer control of stocks are scientific methods increasingly applied.

Marketing. As the markets in many countries turned from sellers' markets into buyers' markets, marketing gained enormously in momentum between 1950 and 1960. Market research led to the acceptance of new marketing methods in most western countries. Thus department stores, chain stores, self-service stores, and mail-order houses took an increasing share of retail distribution. It may be questioned whether cheaper distribution costs or the greater ease and variety of choice for the consumer are the predominant advantages of this development in the 1950's. In certain trades it could be observed that the producer is drawing nearer to the consumer; this applies to the export trade as well with industry sending its own salesmen into the export markets. Intensified national advertising for specific products or trademarks is another indication of marketing efforts.

Financing. Emphasis is put on obtaining quicker results from the books in order to enable management to evaluate business activities by results monthly, weekly, or even daily. This is being brought about by the intense use of electronic bookkeeping and data-processing equipment. There seems to be no end to this. The more complex a company, the more important is an early availability of detailed results. Generally speaking countries outside the United States are lagging behind in this respect.

Cost Accounting. This management function has gained considerably in importance, precision, and application in the analysis of actual costs, in the calculation of sales prices, and in budgeting of all activities within the organization. International standardization of costs-classification would open valuable opportunities for international intercompany comparison of costs. Computers for data-processing are in expanding application.

Personnel Management. To report progress in this field of management activities would mean to say that both management and labor have gone through a mental revolution and have improved mutual understanding of their common purpose. No field of management and labor activities has been given so much thought as this. But in evaluating results one must keep in mind that there are not only common interests. Internationally it must be kept in mind that Karl Marx's ideology of "class-war" is still of strong influence and on the other hand management does not always comply with Taylor's definition of scientific management. A clear distinction can be made in many cases between individual employer-employee relations on the one side and the relations between employer associations and trade unions as collective organizations on the other.

Nevertheless, it is a safe statement that many successful efforts were made by management with the support of employee representatives to increase the sense of participation on the side of the employees in the 1950's; such as, suggestion plans, delegation of authority and responsibility as far down the management hierarchy as possible, better publicity on the policy of the company and its results, round-table communication horizontally and vertically, employees-councils, codetermination, compensation by results, profit-sharing, employees' administration of and participation in old-age-pension-plans, canteens, health-improvement-schemes, hobby-organizations, and other activities within the company. Structure and attitude of trade unions is an important influence on the management activities in the personnel field. Here a great variety can be observed nationally. Political power, financial resources, range of trades each union incorporates, direct influence on the individual company are some of the elements the student will find varying in its nature. Trade unions did a lot in the 1950's for management training of their members in order to put them on a more equal footing with management in bargaining with it. Scientists endeavor to help in overcoming human difficulties by deepening their studies of sociology, psychology, physiology, and so on. They certainly can contribute many important experiences, facts, and interrelations. Management must keep in mind though, that no panacea will ever be found in any country, which will solve all our human troubles. Managers will have to solve human problems collectively or in each individual case with brains, with heart, and with understanding for the other fellow's worries and motivations. They will have to know exactly when they have to say "No!" and how to say it.

Professional training has been considerably improved partly by training within industry (TWI). Training schemes for skilled workers have been introduced from European countries into the United States and elsewhere. Refugee retraining presented quite a problem in the countries adjacent to the communist world.

The search for more satisfactory compensation schemes was world-wide in the 1950's. Job evaluation has been introduced after careful studies for a better correlation between quality of work done and the level of compensation paid for it. Predetermined times-methods have begun to help considerably in revising existing piece rates and in setting of correct new methods and rates.

Particular problems arose in development countries on account of racial and religious reasons. It seems to be particularly difficult for those people to understand the philosophy behind willful planning into the future as a basic element of western industrial philosophy. How to adjust its management-development methods in order to make them understandable for people in those countries is quite a task for management experts in the West—together with the development of management teachers capable of speaking the langauges and of understanding the attitude of people in those countries.

Public Relations. This management function does not only include publicity for the company but is a challenge for management to assume its role in public life (industrial federation, employers' associations, national and international committees, scientific, social, and charity boards, and so on). Leading companies in many countries not only delegate top managers for such activities but equally managers from the other management levels. Regional integration such as in Europe or South America finds management taking an active interest in it. Reference can be made to the CIOS European Management Conference, 1958, in Berlin, on the subject "European Integration—a Challenge to European Management."

Conclusion

The picture of "International Progress in Management, 1950–1960," is so complex that the author could but touch upon some of the more important subjects. Progress has been made to a greater or lesser degree toward Frederick W. Taylor's vision of scientific management. Still, management has to go a long way before it will build an industrial world that satisfies equally well management, labor, consumer, and government. It has but scratched the surface of the problem of convincing the man in the street of western countries of its value (despite all the shortcomings due to freedom of the individual)—in comparison with the communist "perfectionist industrial world" with its sacrifice of freedom.

The great modern philosopher, the late José Ortega y Gasset, closed his paper read before the CIOS European Management Conference, 1954, in Torquay, by quoting a Spanish Cardinal Borjy declaring war on France in saying: "Sir, war is the solution for situations that are insoluble." Ortega continued by calling war—with armaments on both sides being as they are—an "obsolete means of solving any problems." He appealed to management—as a group of people who are used to solving problems without war—to use their brains to find ways and means of solving the problems which seem insoluble up to now. Let us hope that, at the end of the next decade, management will have succeeded in living up to the great philosopher's expectations.

DISCUSSION

Walter Scott[3]

Dr. Mittelsten Scheid has covered, in superb fashion, not only a difficult subject but also a subject which covers a difficult period. It is indeed hard to add to the conclusions he has reached, nor would one want to quarrel with any of them. What follows, therefore, is only by way of comment.

Perhaps in the definition of the "purpose and meaning of management" some reference to management's responsibility for the training and education of employees and of linking this with management succession at all levels could have found a place. Dr. Mittelsten Scheid may well have intended that this would be part of the fourth factor and even of the third. Management's conception of its responsibility in this direction has, I believe, grown sufficiently in the last decade to warrant its inclusion as a separate section of responsibility.

I would also like to have seen more emphasis placed upon the planning function. During this decade this movement has, I believe, been accelerated and the planning function has grown greatly in stature. The very trend of today's conditions necessitates this. Competition, for some time after the war at a minimum in many industries, has extended from an intra-industry, to an inter-industry, and to an international basis, and bids fair to be affected also by ideological factors. Furthermore the contribution of research has focused attention upon the vital role of planning, and shown the necessity for planning for a further period ahead, yet inbuilding dynamic but flexible qualities. The long term planning aspects which will be so vital in the 1960's have been generated in the 1950's.

Dr. Mittelsten Scheid's reference to management's part in shaping the national economy shows, I believe, keen and prophetic insight. This is perhaps another area where it may be argued that though comparatively little and perhaps not satisfactory progress has been made in this past decade, seeds may have been planted to blossom in the next.

Whilst secondary and tertiary industry in many countries prides itself upon its productivity achievements during the past 10 years, such achievements have been exceeded in many countries by primary industry productivity improvement. Management in this area, too, has made much progress. One of the important developments of this period has been the way in which Management tools and techniques formerly used for one area of Management activity have been expanded in use to embrace other Management areas. Thus the same methods used to improve factory operations are now more widely used in the fields of distribution and the office, and tools and techniques used in secondary industry are being applied in the field of primary production.

The magnitude of Dr. Mittelsten Scheid's task is best shown by the fact that he has had little alternative but largely to confine his attention to the industrialized and Western world. Nevertheless the word "International" invites if not demands the note in passing at least that there has been great progress in these past 10 years in the improvement of management methods in the lesser developed countries. Some part of this progress was almost the inevitable accompaniment of a broadening stage of industrialization. Indeed a study of the international progress in management pointed at the lesser developed countries would, in itself, make as fascinating a study as Dr. Mittelsten Scheid's present paper. His brief reference to the "over-all and world wide nature of management" shows he was conscious of wider implications.

It is typical of Dr. Mittelsten Scheid's keen and penetrating mind that he has devoted a significant part of his space to personnel management. He, better than most people, has always realized the deep significance of this factor in deciding management's place in the community.

Many would feel that this is the disappointing area of Management's achievements during the period under review. Some indeed would believe that progress in the 1960's could founder upon a disappointing rate of achievement in this most difficult but vital field of human relations. This, perhaps above all others, is the not too brightly burning torch that 1950–1960 has handed on to Managers to care for assiduously in the next decade.

These are but somewhat random thoughts generated by Dr. Mittelsten Scheid's masterly survey of a fascinating but involved subject of global proportions.

John B. Shallenberger[4]

In his paper on "International Progress in Management," Dr. E. Mittelsten Scheid has fully encompassed, courageously and with deep insight, a very wide subject.

First, Dr. Mittelsten Scheid has taken a positive approach to a perhaps self-contradicting subject title. Surely this is the last decade in which anyone will speak of progress in any art or science as "international." The world is too small and science too broad to permit of geographic borders or isolated progress. Science and art are "anational" or universal. Progress, wherever it appears, is founded in our whole planet's knowledge to date and is applicable to the whole planet's work.

The fact that many nations have participated in management progress and that mechanisms have been developed for facile interchange of management knowledge between geographic areas is the only thing which can be isolated as "international" in management progress, and it is a minor phenomenon compared to the subject which should have been specified and which Dr. Mittelsten Scheid fortunately did discuss, "Progress in Management." Let us never again think in terms of scientific progress as *anything* but universal.

"The Great Alternative" mentioned by Dr. Mittelsten Scheid is a discomforting prospect, but it bears out the fact that management principles, whatever they are, may have different appearances as applied in different cultures. This is worth noting,

[3] W. D. Scott & Company, Pty. Ltd., Sydney, Australia.

[4] Research Director, CIOS, Palo Alto, Calif. Mem. ASME

but it must not be permitted such weight as to create the deception that the principles themselves are different in different political or cultural environments.

Dr. Mittelsten Scheid has in limited space exhaustively and most ably encircled the entire spectrum of principles which have gained attention and whose progress can be measured over the past decade. His appraisals are accurate summaries of the progress made during that period and in those functions. We benefactors of management science should be quick to concur in his implied tribute to the foresight of the early pioneers of scientific management, whose prophetic statements as early as the Prague Conference of Scientific Management in 1923 could hardly have more accurately seen the broader needs of managers if they had been written today.

Second, the next decade will probably reveal a possible omission, from the spectrum of management areas covered by Dr. Mittelsten Scheid, an area occupying a separate wave band within Dr. Mittelsten Scheid's management-functions spectrum, long range planning. Some very few managers have accepted, learned, and applied *long range planning* in their managing practice during the decade just passed; very few have been consorting with this really important sophistication of the old areas of "planning," "policy formulation," and "forecasting."

Third, different areas of management practice seem to enjoy different learning rates within managers' minds. And areas with the same learning rates are sometimes succeeded by different application rates. It is both the expansion of knowledge and the use of knowledge, in terms of learning and application, which spell total progress in a science. Dr. Mittelsten Scheid seems to have concentrated on the second of the two elements, use of knowledge, possibly thus measuring the expansion of knowledge by its use. His analysis of progress in divers areas of management suggest that the rate of growth in learning and application of management knowledge has been relatively high over the past decade in organization and policy, planning, production, purchasing, marketing, and cost accounting. This rate has been lower in areas of financing, personnel management, and public relations. Dr. Mittelsten Scheid covers briefly the first of the two elements, expansion of knowledge, in his discussion of research and development, and he lists this area as one of those in which progress has been relatively high. These relative rates of progress are roughly substantiated in the observations of this discusser.

Fourth, two areas in which progress has been relatively slow, according to Dr. Mittelsten Scheid, are in personnel management and in public relations, confirm this discusser's belief that the breakthrough in human relations is still ahead of us. In management functions closely involving human behavior, the science exists in codified form; researchers and specialists in the behavioral sciences understand their science after some years of profound investigation and study. But the average manager, not educated deeply and over long years in that one science, is at a loss to acquire for himself the abundant knowledge which must have been gathered on that subject.

A challenge: for ASME, for CIOS, for management associations everywhere and for the *next International Congress of Scientific Management to be held in this city in 1963*, lies in the opportunity of *learning how to bring the inscrutable behavior sciences into focus for the acquisitive but time-starved manager.*

Author's Closure

Both Mr. Scott and Mr. Shallenberger have laid their finger on a lack of emphasis on

(1) long range planning
(2) management development and human relations
(3) management succession
(4) management in development countries

in my paper. Mr. Shallenberger is right in stressing the different rates of progress in various management fields of functions. It may even be stressed, that in various industries, distribution, transportation, public administration, etc., the emphasis on various management functions varies to a great extent. My general remarks in the Conclusions did not make it clear enough to the reader that they refer in fact to these differences and to the challenge that lie before management all over the world in the Sixties.

(1) *Long Range Planning* has been accepted as an important subject in business policy in the majority of the advanced companies. Smaller companies will have to put more emphasis on it in the future if they want to keep in line with progress.

(2) *Management Development and Human Relations* play an increasing part in industry. They should be seen in close conjunction. It may be desirable to put more emphasis on the latter aspect of management development in all management courses. It should be observed, that building human relations is more than just applying some "technics" to the employees. Behavioral Sciences should more and more contribute to management knowledge on the human being and his reactions—but a warning should be voiced as to the opinion that these sciences could offer in the long run means to "manipulate" people and that such methods would be desirable for management.

(3) *Management Succession* was clearly mentioned as item 1 of the "Management Functions." I am grateful, Mr. Scott has stressed it as one of the most important management responsibilities.

(4) *Management in Development Countries*—I must admit—has not been given an appropriate place in my paper. In fact the development of modern management in those countries will make all the difference. Entrepreneurial attitude in those countries so far was more inclined toward "trading" instead of "leadership" with the great number of responsibilities toward the employees and the public connected with it. The ability of long range planning will have to be developed with high priority along with the understanding for national and international political and economical development.

Let us hope management will succeed in building a tradition in human relations in the organized work of human beings—such as all the religions have brought about over hundreds and even thousands of years.

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Management Education—Professional Societies[1]

A NATIONAL adult education program in management with over 100,000 participants and nearly 3000 committee and staff members engaged annually in preparing and executing the program is an important effort worthy to be dealt with in this series of progress reports. This program is the work of professional bodies[2] which have as one fundamental purpose that of serving their members by providing "interchange of experience." Benjamin Franklin called it "mutual improvement" when he formed his Junta in 1727. Today the American Management Association states it: "Management is the theme, experience is the textbook, and members learn from each other."

Professional bodies perform additional related educational functions. They encourage the development of new ideas. They recognize praise-worthy achievement by suitable awards. They sponsor research and establish standards. They support all these functions by complete publication service.

These educational services are provided to meet a demand arising from the complexities of engineering, business, and industry. This demand is fundamentally professional requiring that the person who exercises any degree of managerial responsibility shall have some special education at the start of his career and that as he grows in responsibility he shall be further educated or re-educated. These later educational processes are provided in large part by the professional societies.

The purpose of this paper is to report how a selected few bodies carry out their educational functions. The selection, necessary by space limitation, was made to show different methods of operation.

Interchange of Experience

Experience interchange is provided by several methods: formal addresses by leaders, planned sessions for the presentation and discussion of selected papers, panel discussions, conferences of varying degrees of planned formality, seminars, workshops, and courses of instruction.

Formal Sessions

In 1886, six years after its founding, THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS entered the field of management education with the address by Henry R. Towne on the Engineer as an Economist which portrayed the management function of the engineer and related management thought to engineering practice. In the three decades that followed, distinguished leaders in ASME, who were vitally concerned with shop management and production, brought to the Society the results of their work in the classic management papers of Taylor, Gantt, Barth, Gilbreth, Halsey, and a score of others who were applying engineering fact-finding to management and providing the basis of "scientific management." In 1920, when the various specialties in mechanical engineering were organized as professional divisions, the Management Division of ASME was formed. Since that time, the Division has sponsored sessions at the ASME annual meetings and provided the platform for the annual Towne Lecture which treats broad management problems. The Division is organized to support the 98 Sections of the Society in planning their own management programs. An annual Management Executives Conference is held at which an invited group of policy level executives discuss informally major current management problems. With the Society for Advancement of Management the Division sponsors a two-day conference dealing primarily with industrial management at the operational level. Over the past several years, ASME has taken the leadership in interesting other engineering societies in accepting their responsibilities to deal with management problems. As a result, an annual conference on the "management of engineering" is being held, in which, in the past four years, seven other engineering societies have participated.

The Society for the Advancement of Management came into being with the combination of the Taylor Society, Society of Industrial Engineers, and the Industrial Methods Society. SAM holds annual conferences (one sponsored with ASME) on the latest developments in industrial engineering and in broad areas of management. Its 75 senior chapters and 137 university-level chapters hold meetings and discussions on all phases of management theory and practice.

The American Management Association was organized in 1923 as the combination of several management organizations. To cover the field it is organized in ten divisions: General Management, Personnel, Finance, Office Management, Insurance, Manufacturing, Marketing, Packaging, Research and Development, and International Management. Each Division sponsors an extensive program of conferences held at widely spaced points with an annual attendance of 80,000 executives, from juniors to company presidents. These conferences are focused on current problems of great importance, an example being the Conference on Economic Mobilization held in the 1958 recession which was addressed by the President, Vice-President, and Secretary of Commerce of the United States and by many top business leaders.

A particularly valuable means of experience exchange provided by AMA is the Management Information Service equipped with a good library that includes many unpublished items in addition to published literature. It answers more than 21,000 inquiries annually. The AMA Executive Compensation Service provides complete up-to-date facts on how much business executives are paid, and by what methods.

The tremendous growth of AMA in the past decade is tangible evidence of the educational usefulness of "interchange of experience." Its membership and participation have doubled, expenditures increased tenfold, assets seventeen times, and staff six times. From small office space in 1950, it has expanded to three

[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

[2] The National Industrial Conference Board performs an educational function in the management field. While its organizational structure differs from that of the bodies treated in this paper, its unique contribution is worthy of recognition and a brief account of its work is given in the Appendix.

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full floors in a mid-town building in New York, a round the year operation of the AMA Academy at Saranac Lake, N. Y., and a summer operation at AMA property and on the campus of Colgate University, both in Hamilton, N. Y.

The American Institute of Industrial Engineers, organized in 1948, holds annual national conferences and meetings of its 105 chapters which are organized in ten regions. AIIE has established its purpose as being concerned with the design, improvement, and installation of integrated systems of men, materials, and equipment. Industrial engineering's mission of design serves management in its direction of operations. Industrial Engineering is regarded as an opportunity for growth into the managerial field.

Seminars, Workshops, and Courses

The AMA has established since 1950 a comprehensive program of Seminars and Courses.

Each of the ten AMA Divisions conducts seminars in which operating executives participate as both "faculty" and "students." Seminars are of two kinds: workshop seminars for seasoned executives to exchange operating experience on selected topics and orientation seminars primarily instructional for participants to learn the best current practice in a specific area. These seminars are held at the Hamilton center in the summer and at New York and Chicago in the fall. In 1960 it is expected that 16,000 executives will participate.

Twelve courses are offered by AMA. These are programs of a week or longer devoted to such topics as Basic of Management (in which 6000 have participated), Management for Government Executives, Marketing, Cost Reduction, Personnel, Production Planning, Systems, and a Management Course for Presidents. These courses are held at the Hamilton center, at New York, and other places.

The chapters of SAM have staged courses, in co-ordination with local universities which have covered the gamut of management practices and principles. In 1958 in Philadelphia SAM initiated the Advanced Management Course designed to prepare middle managers for the problems arising from advancing technology. This course has been worked out so that it can be repeated in other cities under local leadership.

ASME and AIIE have developed outlines for seminars and workshops on a number of management subjects which are available for sectional and regional groups for education purposes.

Interchange Across National Boundaries

The International Committee on Scientific Management (CIOS) since 1924 has held 12 international congresses for the interchange of management experience across national boundaries. American management participates through a U. S. national committee styled the Council for International Progress in Management (CIPM). Since 1950 CIPM has planned and executed study programs for almost 2000 managers from 25 countries comprising 142 different groups. Since 1951 the Council began recruiting and organizing teams of American management experts to go to other countries to hold meetings or seminars with their counterparts there. Starting in the Netherlands and spreading throughout Western Europe, and now to Latin America and Asia, these teams have visited 20 countries sharing their ideas with some 24,000 managers.

AMA has organized the International Management Division to make AMA services and facilities more useful and available to managers overseas. A center has been established in Brazil to be of direct service to managers in South America.

Research

AMA has a research program under the leadership of a vice-president. One part of the program, conducted largely by AMA staff, includes projects on manpower utilization, on the adult learning process (pointed to improving methods used by AMA), on the effectiveness of simulation of cases programmed into a high-speed computer as a training device and on a wide range of economic and statistical problems. The second part provides support of research efforts by grants for specific projects designed to improve specific techniques selected phases of management.

Standards

Two of the societies are at work developing qualitative bases of comparison. AMA is working on the development of standards of managerial performance with the view that in perhaps five years managers may receive formal certification. AIIE is developing standards for Industrial Engineering education by attempting to specify minimum curriculum content in quantitative measures but avoiding the too rigid specification that discourages experimentation.

In the field of formally authorized standards the ASME Council has approved standards on Operation and Flow Charts and on Plant Layout Templates and Models. The ASME standard of Industrial Engineering Terminology is presently being revised. SAM has produced Rating Time Study Films for training time-study men in an objective concept of a fair day's work and two glossaries, one on terms used in Time Study Methods and Wage Incentives and one on terms used in Personnel Management and Industrial Relations.

Publications

The societies have developed a rich literature of great importance in management education. All have periodical publications which perform a useful current function. There are the published standards mentioned above. AMA has a catalog of 150 manuals, research reports, and other documents which record experience in every phase of management and offers four films dealing with Operations Research, Collective Bargaining, Electric Computers, and Product Pioneering.

Awards

The CIOS Medal is usually awarded at each International Congress for outstanding contribution to management. Nine awards have been made to leaders throughout the world.

ASME and AMA participate in the award of the Henry L. Gantt Medal for distinguished achievement in management as a service to the community. Twenty-five awards have been made since the medal was established in 1929.

ASME, SAM, AMA, and the Association of Consulting Management Engineers join in the bestowal through CIPM of the Wallace Clark Medal for distinguished contributions to management in the international field.

ASME Management Division presents a best paper award and recommends candidates for Fellowship and Honorary Membership in ASME.

SAM administers the Taylor Key and Gilbreth Medal for leadership in the fields typified by the work of Taylor and Gilbreth. It administers the Human Relations, Industrial Incentives, and Material Handling Awards for excellence in the fields indicated. Professional Manager Citations are awarded to individuals upon the nomination of individual chapters.

Summary

The effectiveness of this program of adult education in management defies measure. The exhilaration which the participant in "experience interchange" enjoys cannot be weighed. The

increased profits of the companies whose managers have given to or received from the process cannot be counted. Suffice it to say that in our way of life the program will increase and improve.

APPENDIX

The National Industrial Conference Board

The purposes of the National Industrial Conference Board, founded in 1916, are to conduct research in business economics and management, to assemble and analyze information about economic conditions and management experience in the U. S. A. and other countries and to disseminate results thus gained through publications, conferences, and other means to business, industry, education, and the general public.

NICB's governing body has over 300 individual members from U. S. A. and Canada, twenty-nine representatives of affiliated organizations, and seventeen foreign correspondents selected from persons distinguished in business, public affairs, education, or science. Its work is supported by about 3700 associates; business, labor, and educational bodies.

The research program of NICB is comprehensive in its field; having produced during the past decade 175 studies in business policy, personnel policy, and business economics. Of importance to engineering management are those on radioisotopes, economics of nuclear power, standardization, inspection, plant location, and industrial engineering—organization and practices. NICB has an advisory council on Industrial Engineering—Methods, Work Measurement, Motivation, and Payment Plans.

The annual conference pattern consists of five or six open conferences of one to three days at distributed points, four meetings of the Board members, and courses and seminars for more limited audiences on such subjects as personnel administration, consultive management, and economics for executives.

The dissemination of NICB research results and conference proceedings is through a system of weekly, monthly, and periodic publications to the Members and Associates with a liberal policy of distribution to educational institutions and libraries. An information service, through a well indexed collection of NICB data and a complete library of related material, provides first aid for the businessman seeking an elusive fact.

In 1954, a Canadian office was opened to bring the facilities and experience of the NICB staff in touch with the Canadian scene. During the past decade NICB activities have multiplied two and a half times.

In the increasingly complex world, there are still unsolved problems of current and long-range importance to which NICB may direct the attentions of its unbiased experience and skill.

DISCUSSION

Walter Mitchell, Jr.[3]

Clarence Davies, as one would expect, has done a splendid job in putting this story into concise form. I cannot disagree with anything he says.

I cannot even add to his history of the development, other than an item which has occurred since he wrote this paper.

This is the rather astonishing start of the SAM Advanced Management Course in seven cities (assuming that Greenville comes along), reaching, in this Fall of 1960, its second pilot stage. The first pilot stage in Philadelphia (1959 not 1958 as stated in Davies' paper), demonstrated that the Course was going to meet a wide-spread need for decentralized management development programs. Many a man cannot be spared from his job, or his company feels that the substantial cost involved in the man's absence from his work is even more important than the cash expenditure for his travel and tuition at a residence course.

The second stage, running this winter of 1960–1961, is to enable SAM to develop adequate procedures for the difficult task of co-ordination. When the same courses are running in several cities at once, how does one assure at least a minimum of quality, yet at the same time not constrict the creative thinking and educational experiments of the able course administrators and course participants in those several cities? This is a problem which, as far as we know, has never been faced by any organization before.

The other comment which I may make on Mr. Davies' paper is in the nature of a prediction. We have now discovered in many instances that certain types of discussion and certain perspectives on knowledge that can be used by a manager cannot satisfactorily be studied at college age.

After a manager attends a course, he goes back to his company and begins to apply some of his new perspectives and modes of thinking. Often he is tempted to say, "If I had had this kind of training earlier, wouldn't I be much further along in the management of our company today?"

Then, if he has a truly open and introspective mind, the manager reaches a second stage of conclusion: "No, if I had had this course right after I came out of college, I would not have understood what it was all about." Any designer, or administrator of a management course should be pleased when that reaction is achieved. It is a far more difficult thing to achieve satisfactory results at this level than at a college or post-graduate level.

We are just emerging into this stage and have not yet fully appraised its significance. Nevertheless, my prediction is this—that in the course of the next 10 to 20 years a considerable reassortment of subject matter will occur. From our present college curriculum, we will delete those things that can better be learned at a later date. We will include in the college curriculum things now omitted. We can, I think, evolve a pattern which should result in a broad gage application of the motto that has long been used by SAM "A lifetime of learning."

C. G. Worthington[4]

This paper by Clarence Davies provides an able description of the methods used to further the aims of the oustanding organizations to which he referred. The periodical literature, information services, formal meetings, seminars, courses of instruction, and informal conferences have all proved their worth as attested by the increase in their popularity with the years. All of these, with the exception of formal courses of instruction, are provided by the Industrial Research Institute, a nonprofit organization whose members are some 175 industrial research departments. We wish to call attention to an innovation with regard to the informal conferences which we believe is unique.

Our Study Group conferences are attended by 15–20 persons representing member companies. They meet for two days to discuss topics such as evaluation of research, or the transition from research to production. Each participant occupies a managerial position in his company to which the subject of discussion is of vital concern. His thoughtful observations are based on experience. Combined, the record of the two-day proceedings is a distillation of best practices and tested approaches to problems of management in industrial research.

We record the proceedings of these conferences anonymously, edit them, and submit the edited copy to each participant for comment. We make the necessary changes in accordance with

[3] Society for Advancement of Management, New York, N. Y.

[4] Secretary-Treasurer, Industrial Research Institute, Inc., New York, N. Y.

the comments received and then publish the report in our quarterly journal *"Research Management"* for the benefit of all concerned.

Reference was made in another paper[1] to the enormous expansion in industrial research that has characterized the economy of the decade from 1950 to 1960. The Industrial Research Institute has found the Study Group program to be effective in the furtherance of its goals of developing and disseminating information on management principles and practices which are in keeping with that dynamic growth.

[1] Harold K. Work, "Practices in Operational Management—The Management of Industrial Research," published in this issue, pp. 297–302.

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Management Education—Industrial[1]

In 1950 the National Industrial Conference Board issued its Studies in Personnel Policy, No. 107, dealing with "company programs of executive development."[2] In the Foreword, Dr. Stephen Habbe, the author of that report, mentioned that in 1943 the Conference Board had set out to make a study of training programs of executives and found that there were "not enough such programs to form the basis for a report."

As additional inquiries began to come in from companies requesting information, the Conference Board tried once more, and their 1949 review bore fruit. Their report describes the stories of nine companies with well defined activities in this field.

S. A. Raube, Director of the Personnel Administration Division of the Board, remarks on the great diversity among the programs reported, and the twenty different training techniques used. He also comments on the clear evidence found of top management's fears that executives would not co-operate with developmental programs were unfounded. There was widespread interest among the executives in such programs if they appeared to them to be "well conceived."

In 1952, the University of Michigan published its "Report #5" surveying the executive development work in fifty companies in sixteen different types of business.

The Michigan book points out that the companies whose experiences are reflected in the report regard executive development as a way to "improve net earnings" and, for the longer future, "contributing to their survival under competitive conditions" and the ability to adapt themselves to changing circumstances of operation. The word "program" is used to represent a systematic, continuing treatment of a problem, and the word "development" rather than "education" tends to be chosen to emphasize the responsibility of the man himself for the learning.

The book notes that the origin of this movement lay in growing interest in long-term survival of the firms, in greater specialization of managers and technicians, in greater appreciation of the strain imposed on the executive, in the prevention of stagnation on the part of the more experienced and older, and growing realization of the importance of supervision. Attention is given the more intimate relationship between corporations and the government, corporations and the unions, to the rapid expansion in size and complexity of firms along with decentralization of operations and controls, to changing methods of organization requiring retraining, the shift to a buyer's market, and to the many implications of employee attitude surveys showing relative variations in motivational level depending on quality of supervision.

"Executive inventory" and organization planning were frequently followed by a program of executive development in some one division of the company and then the president might announce the decision to inaugurate a company-wide program of the same sort, which had worked well in some more limited component of the company.

In a few cases, programs have started at the top and have then extended downward. In a number of other cases, the programs were started at the middle management level, or sometimes first at lower levels of supervision.

The necessity of performance appraisals and some research, as to what are the differing characteristics of good and poor executives and whence they respectively originate in the practice and experience of the enterprise, begin to show up at an early time.

The organization changes forced both in government, military, and industry by the war experience and the shift of younger men, particularly from civilian to war related jobs and then back again in the forties, intensified the need for "assessment procedures," "performance reviews," "management audits," and then gradually more formal education programs.

Some of the government experience affected the development of company activities. It was James Forrestal, Secretary of Defense, who initiated the research that led to the publication of a Navy Report, in 1948, including highly formalized specific procedures and forms for the control of "executive inventory."

The companies frequently turned to university courses, and the Advanced Management Program of the Harvard Graduate School of Business Administration had, at the time the Conference Board Report was made, held sixteen sessions of thirteen weeks, training 1200 men from more than 250 companies. Such a course would be included frequently by a company as part of their executive development program.

The Conference Board study included five suggested goals for a company program, as follows:

1 Human relations
2 Job competence
3 Company knowledge
4 Personal development
5 Creative imagination

The authors asked their responding companies to rank these goals in order of importance. On the basis of company response, the list became:

1 Job competence

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[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

[2] The principal emphasis in this paper is upon the in-company educational programs for middle and upper managers. We are not ignoring the fact that a greater portion of the volume of educational effort in companies is expended on the development of better supervisors at first, second, and third levels. Such effort, well under way before World War II, underwent a quantitative explosion in connection with the defense effort in the various "J" programs sponsored by the government for the defense effort. This was followed, picked up, and elaborated by such programs as those of the National Foremen's Institute, the Research Institute of America, and the numberless university and corporation programs in such varied fields as safety and economic education. However, the principal characteristic of educational practice for the lower half of the management pyramid in the decade covered by this report was simple, straightforward expansion and intensification rather than innovation. There was some development about 1950 of greater attention to research effort to measure the effects of such supervisory training especially in the human relations area. The same difficulties in finding techniques for measurement and adequate criteria have shown up on the supervisory level as referred to in this report on the manager education program in the upper levels. In spite of the absence of validated proof as to the effectiveness of such educational practice, the scope has continued to advance, but there have not been significant innovations either in content or method within the decade treated by this report. Therefore separate treatment of supervisory training will not appear herein.

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2 Human relations
3 Personal development
4 Company knowledge
5 Creative imagination

In addition, the report suggested that the following subject matter elements of the executive's education seemed to be in the background of curriculum planning for many of the programs:

1 Principles of business organization
2 Elements of supervision
3 Management fundamentals
4 How to think logically
5 How to arrive at a sound conclusion
6 How to let go
7 How to delegate work and get things done through others
8 How to work with people
9 A knowledge of what goes on in all departments of the company
10 Company policies
11 How to speak and write effectively
12 Practices of competing companies
13 A broad picture of country and world affairs and how they affect the company
14 How and when to say "yes"
15 How and when to say "no"

The conference report lists twenty *techniques* of executive development divided into five *almost always used*, six often used, and the remaining nine *sometimes* used.

In contrast to 1960, the 1950 list contains little reference to company organized and conducted formal courses on *management science* for *upper* management people. Such highly systematized educational programs were, in 1950, sought mainly in the universities. The almost always used list included group meetings, the distribution of reading lists, and attendance at management conferences.

Now, after the passage of the decade, there are obvious shifts in emphasis on the part of management itself in response to the changing environment.

The accelerated rate of environmental change has seemed to call for an accelerated rate of *education for change*. The emphasis upon long-term strategy and planning has called for more emphasis upon *diagnosis*. The awareness of the unique nature of each corporate enterprise, its *corporate image*, its *social role*, its own peculiar linkage with *technology* and the *market-place* seem to make it necessary that the managers have not only managerial experience, but a digest of *natural* and *social science* findings as they relate to the work of the particular corporation and its strategic situation in our present economic and political environment.

The most obvious and dramatic trend in manager education during the past decade is its *quantitative* aspect. Company after company, since 1950, has realized the *shortage* and the *inadequacies* of managers, and has begun to send managers out to those universities which "hung out their shingles" and, more gradually, has begun the procession of companies setting up some kind of "institute program" of their own, either in rented quarters or on purchased estates, or in buildings especially constructed for the purpose.

There is no authoritative list dealing with numbers in this case, but an eminent student of adult education has pointed out that the educational budgets of the corporations of the United States, if all kinds of training were included in addition to this recent, most deluxe version, might well approximate in size the budgets that we customarily think of when we consider the expenditures for school and college. There is every indication from even a casual acquaintance with literature that in-company activities for the lower levels of management (including first-line supervision) represented by the innovations in the decade prior to 1950 have been widely spread, imitated, and experimented with.

Zaleznik in his book "Foremen Training in a Growing Enterprise," 1951, identified "at least four types of training. . . . (1) training in company programs and policy, (2) technical training, (3) training in economics, and (4) human relations training."

Ronken in *Harvard Business Review*, July-August, 1954, reports that "even supervisors who have shown genuine interest and insight in the training sessions (which makes the training director justified in being pleased with his work) are stumped when they get back to the real relationship and find that things have not developed in just the way they expected." A little bit later appears the statement—"There is something stubborn and persistent in a situation that tends to maintain the superior-subordinate relationship at about the same form regardless of the courses which the supervisor has attended."

This kind of critical note with regard to the actual changes in working patterns produced by the beneficial forms of supervisory training has been supported by some fairly tight research projects (such as International Harvester and Canadian Power & Light) which seemed to show at times an actual deterioration of a work situation as a result of educational programs.

The writer does not know of much real innovation in this field except the vertical round-table program of American Cyanamid in the Forties, the Kansas Gas & Electric vertical round-table about the same time, and two different levels of "policy committee" with an over-lapping membership in Marshall Field Mills. Of course, the National Training Laboratories' program and the "sensitivity training" program in Esso Standard represent innovations in the decade covered by this report but so far as the writer is aware, these techniques have not been yet carried down below the middle management level. The American Cyanamid and the other two programs mentioned above were in the decade of the Forties.

Hence, the sum and substance of this report with regard to supervisory training as distinguished from manager education can be summed up under three headings: A—Explosive Expansion; B—Absence of Radical Innovation in Method or Content; C—Gradually Increasing Effort to Find Out What Real Benefits Are Obtained. It would seem likely therefore, as mentioned elsewhere herein, that the more novel practices appearing in more strictly so-called manager education may filter down and affect the trends in the decades ahead in what was once called foremen training. Be that as it may, it is now unquestionably "the style" to provide educational opportunity for some managers at some levels or for all managers at all levels, in the company, by company training staffs, through the associations and educational institutions, or by all these means simultaneously.

The *qualitative* trends in this educational near-stampede are even more significant, but before mentioning these trends in subject matter and method, let us inventory briefly some trends in management itself, which are creating and shaping the *needs* which *determine curricula* and *procedure*.

During the Fifties, the American economic scene has revealed dramatic evidence of several changes which have contributed to the direction of educational effort.

Complexity, Decentralization, and Integration

The expansion of the size of corporations has continued. Even the giants such as General Motors, American Telephone & Telegraph, Standard Oil (N. J.), duPont, General Electric, and many others in the giant list have progressed from being giants to doubling in size to become supergiants, and then toward doubling again, becoming super-supergiants. Also, many small businesses have become average, and average businesses have become large, and large businesses have become giants.

This is true in terms of numbers of employees, sales volume, geographical spread—including around-the-world spread—and diversity of product and services. This trend is clearly reflected in portions of curricula dealing with the "complexity" of modern business operation, and the necessity for co-ordination and feedback and computer techniques in information gathering, information storing, and in decision-making.

Managing the "Egghead"

The enormous expansion in expenditure for research and development has seemed to call for special attention to "innovation," "technology," "product planning," methods of handling research sciences and scientists, and possibly even studying the capitalization and accounting problems of research and development programs.

Marketing

The rapid rise in the American standard of living, the rise of the blue collar class into white collar income, the "new leisure," and the great increase in "disposable income," particularly that portion which can be spent for something other than necessities, all of these and other characteristics have changed "selling" to "marketing," and have called for emphases in manager education programs on consumer research, motivation research, long-range forecasting, the study of economic cycles, etc.

Taxes, Government, Inflation, Labor, Consumer Finance

The enormous rise in postwar taxes, the wide spread of government buying or defense, the rapidly rising price level, and the spread of installment buying and selling, financing of purchases—these and many other factors have combined to call attention to the need for studying inflation, fiscal policy, government relations, "business climate," and tax strategy.

Sociology and Political Science and Labor

The post World War II power of the labor union, the opening of union headquarters in the seat of the nation's government in Washington, recent experience with the New Deal government and labor in politics, and the accumulating labor legislation and collective bargaining practices, and the new role of the unions as investors and owners—all these have combined to put political science and sociology into the manager's educational program. The corporation curricula begin to read more like a university major in social studies or social issues.

Common Markets

The gigantic burden of taxation remaining from the war, the rising cost of labor, the resurgence of foreign competition from such places as West Germany and Japan, the new concern over *raw materials* from abroad, the incipient buyers' market which spasmodically appears, forcing down the narrow profit margins to be maintained only by productivity increases—these and other factors constitute a new challenge. *Better motivation of workers*, more statesman-like arrangements for attention to maintenance of gain rates in productivity, and the political and capital and taxation problems of operating in an international market, both for labor and goods, are increasingly apparent.

Return to Efficiency

Such consideration seem to call in some corporate programs for rather intensive homework in the whole area of employee motivation, automation, cost and benefits, ways of negotiating, and union acceptance of a return to more rigorous industrial engineering and incentives. All this brings back questions of scientific management and human relations or, in other words, efficiency of method versus motivation of people.

The classics of the psychology of work are dug up and translated into question and answer syllabuses for manager parallel reading and discussion groups. The technical journals reporting recent research on methods of compensation as well as the type of supervision which affects productivity levels below the top, including the bottom.

Cold War Marching Orders

The successive political and psychological "shock waves" coming from Russia's political, economic warfare, gradually turn even isolationist minds almost inside out in spasmodic realization of the existence of first class competition not only for the minds and hearts of men, but for markets, raw materials, and even the continued American existence as a first class power. This kind of repeated snatching away of complacent assumption that we will have ever more continual gains in peace and prosperity has been responsible for putting into curricula for managers such subjects as the world-wide population explosion, the nature of "fourth-dimensional warfare" (this fourth dimension being political and psychological), and strategic decision-making. Globes and maps of the world increasingly appear in the centers of manager education.

Global Social Responsibility

And the books that managers study tell them that they are not merely executives fulfilling an economic function, striving for a profit, but that they are "administrators," the "elite" of a business civilization, administering a business "institution" that is also a "social institution" and charged with serving the *balanced interests* of *all* and *preserving* the *American way of life*.

So strenuous is the pace and tension of this kind of push on usually more shortsighted managers, usually more focused on the near view, that some have been known to consider quitting a course because the problems were "insoluble anyway." Some have felt like "stopping people on the street" as they walked around to tell them to lift their eyes to the clouds on the world-wide political and military horizon before they were inundated by an approaching tidal wave from the population explosion of the world.

It would be interesting, if space permitted, to write in two parallel columns the replies of over fifty respondents to the "Ten Year Report" query as to the trends in management, especially management problems and requirements in the last decade, and then in a parallel column to list what participants in industry's educational programs say they are getting from their experience. To just pick a few of the "hot words" from the former list, the following are dramatically representative:

1 The key role of the business manager for "stiffening and integrating American society." (Allen [1], Bowen [3], Carroll [6], David [9], Drucker [11], et al.[3])

2 The knowledge needed for professional manager includes a "consistent vocabulary," "principles," the "special kind of work" that only managers do and all managers do and the techniques of divisionalization and "decentralization." (Bursk [5], Carson [7], Carroll [6], David [9], Drucker [11], Maynard [21], Myers [23], Smiddy [28], Urwick [31], Warren [32], et al.)

3 We must stop ordering people to do what they dislike and don't understand, and get them to do what they desire and what has been completely explained. (Boulware [4], et al.)

4 A manager must consider the social implications of his

[3] For full names and affiliations, see list at end of paper.

every decision. (Allen [1], Boulware [4], Bowen [3], Carroll [6], Forrester [14], Gulick [15], McFarland [22], Rathe [25], Smiddy [28], et al.)

5 Marketers must realize that we have more sophisticated consumers who resist TV and appeals to sex and sentiment and we must substitute for them "clean logic." (Bursk [5], Carson [7], Habach [16], Hawkinson [17], et al.)

6 We must get used to living by "circular feedbacks" and "percentage probabilities" and not on "cut and try." We must "organize continuous interview information." (Barish [2], Bursk [5], Dechert [10], Hurni [18], MacNiece [19], McFarland [22], Smiddy [28], Welsh [33], Villers [30], et al.)

7 Luck, hard work, and strong words are no longer enough. We must substitute "planned percentage risk-taking." We need the techniques of advanced mathematics and the behavioral sciences, information gathering, and measurement. "Science now furnishes a stronger foundation for creative 'blast-off!'" (Carson [7], Clemmons [8], David [9], Forster [13], McFarland [22], Ramo [24], Shell [27], Spriegel [29], Urwick [31], et al.)

8 Respondents list "profit center decentralization," "decision theory," "pricing policy" as a principal requirement. (Bursk [5], Carson [7], Clemmons [8], Ellsworth [12], Matz [20], Rathe [25], Richmond [26], Urwick [31], Villers [30], Warren [32], et al.)

9 One laments an "immense tendency" in management science to produce quick results rather than to *work on the foundations*, but mentions this as usual in new discipline. The call instead is for "logic, economics, epistomology, political science, and biological theory." The same author suggests that we tend rather to "misapply the inappropriate and inadequate knowledge such as that of the engineer which is *not* pertinent," when instead we should undertake use of the subjects mentioned to develop the "management sciences" themselves by expanding our *systematic approach to the* work of managing rather than just "scientific management." (Drucker [11].)

This is presented as "the first step since Taylor, Gantt, and Gilbreth in the effort to give management a formal logic and a specific discipline of its own."

Professional Managers

In almost all the responses, there is a tendency to recognize, proclaim, or assume the final emergence of a "management profession" similar in its *social, ethical,* and *educational* significance to the kindred professions of *law, education, medicine, church,* etc. The manager is not merely a *scientific manager* now, he is a *social trustee* maintaining by integrity and foresight, the co-operative relationships amid the competitive claims between those various groups which make up the business process of production and exchange of goods and services.

Within the limits afforded for this chapter, it would be unwise to attempt description of even one corporate program in manager education. The brochures in which these programs are described inevitably run to more words than are afforded here. On the other hand, to use one aspect of any program as illustrative, if done by name, would tend to caricature or maybe even stigmatize that particular program as if the reported characteristic were its total significant emphasis.

The author has reviewed many programs, participated in many, and listened to reports from others who have participated in and visited programs all the way from Switzerland to Stanford University, in geography, all the way in size from American Telephone & Telegraph Company to one company which included their total management personnel—twelve in number—in a group psychotherapy program for 56 weeks.

For this brief review, it seems likely to be more safe and helpful to talk about trends in *scope, content,* and *method*—without naming names.

Scope

There is an increasing tendency to get away from the "crown prince" theory and posit the right of all managers and even all employees to development and to help in self-development planning and to provide such educational opportunity fully or partially at the expense of the employer. At the other end of such an extreme is the "crown prince" practice of picking a few 'key men" for special attention and effort. The trend seems to be away from the latter practice.

The length of formal courses provided for managers has ranged from the ten-month program with family, operated by the Nestle Company in Lausanne, Switzerland, to the ten-day program at Arden House put on by the Reuben Donnelly Company. There is a general tendency toward either a month, six weeks, nine weeks, or twelve weeks as the time provided in industry controlled programs.

Content

As indicated by what has been said previously, there is a steady expansion of content beyond concern for teaching the manager about his own company, and about the techniques of management, in the direction of taking a look at the *changing business environment* and its *rapidly accelerating change* in technology. To this may be added some discussion material from the social sciences and, in exceptional cases, a substantial look at liberal arts, ethics, "contemporary issues," the economics of "business operations in a changing environment," and "great ideas" as studied in special seminars at Aspen and Santa Barbara.

In many programs there reappear continually the old familiar friends—the technique of one or more "functions" of business organization. But the trend line in this decade is toward *greatly enriched* and complicated, horizon-stretching curricula. Even techniques of a completely new function, Operations Research, are steadily, though stealthily, crowding in.

Method

In the matter of method, the tried and true standby of "case method" is still with us on a substantial basis, constituting even the largest single element of formal curriculum in some of the *more recent* programs. However, there is an increasing trend again to *break away* from both subject matter *lecture* and *case* method, and try out such wide variations as "sensitivity training" through methods resembling the National Training Laboratory unstructured group and the "conceptual approach" in studying the principles of management, e.g., at General Electric's Crotonville.

Another vigorous newcomer in the matter of method is the "business game." This, in a way, is an extension of the case method, with the addition of a computer, so that decisions for successive business periods such as quarters or years can be acted out with various standard hypotheses given. Usually several teams compete with each other to see who goes bankrupt and who makes money. There is some criticism of this on the grounds of its unreality, but no criticism in regard to its motivating impact. The zest with which the games are played seems fairly reliably reported from all sides.

Some companies are co-operating in a rather marked variation from the usual pattern of method at one of the colleges (Wabash) by sending men to the college for two weeks a year for a five-year period. The men receive lectures and diagnoses by faculty members and industrial psychologists and are visited on the job in the interim, between such September sessions, by both psy-

chologists and professors. The program has just completed its first flight and therefore substantial appraisal is not yet available to this writer.

Measurement

As a matter of fact, little trend toward scientific measurement or any kind of objective evaluation has as yet appeared in all of this manager education process. Within the last year or two, occasional and strident but low volume voices have been raised asking whether "in fact all of this educational endeavor produces more educated and more competent managers?"

One rejoinder is that we never know that about any education except for simple skills; "why stress measuring this kind of education?" The writer knows two companies that have made a rather intensive though limited effort up to a certain point to get some kind of a check on the effect of their educational program as seen by the participants themselves and by those accustomed to work around them back on the job.

The results of such efforts are not conclusive but are suggestive. Some evidence is seen of greater interest in planning of operations and in motivation of subordinates, and greater willingness to suspend judgment and to argue over issues patiently and objectively. Broadened horizons and slightly more standardized vocabularies on management matters seem to result.

The margins of difference between the "educated" and the "uneducated" apparently is not very substantial, the length of time is recent, and the technical difficulties in the way of any kind of scientific measurement seem at present well nigh insuperable, at least with the budgets available for the task.

In any event, it is obvious that those who pay the bill are happy to continue to do so on an even more expanded basis, and the testimony of "the victim" usually rings with sincerity, enthusiasm, and very respectable words as he describes what he got from his experience. This favorable testimonial in behalf of the "patent medicine" is not universal, but so nearly so as to indicate that for some time yet the trend lines of expansion and diversification found in this study may well continue.

It is to be devoutly hoped that the tendency to *varied* methodology of instruction will further spread and diversify since it is obvious that there exists no authoritative *pedagogical* literature to guide those who plan education programs for forty year old adults of twenty years' business experience seeking to "expand their horizons," "retread their minds," or "supplement their skills."

Another devout wish which can hardly be called the expansion of any existing trend is for more *attention* and *budget* put back of the effort to find at least more *objective evaluations* if not more quantitative measures. Quite apart from the matter of whether the general *over-all results* are in question as to *their value*, some such measurement studies must be available if *disputes about method* and *subject matter* are ever to be settled on anything besides popularity, imitation, prejudice, and "empire building."

In summary, the American corporation with typical American belief in salvation by education has, since 1950, supported a unique and impressive educational revolution which is still in explosive acceleration. Since policies, climates, and budgets are usually set from the top, we may expect to see styles in "foreman training" increasingly set by results of "executive education." Corporate leaders early found it congenial to progress by "training the workers," then the foremen, then middle and functional management.

They are increasingly approaching the example set by General Foods which in the Forties gave a new management development program first to their board members, and then moved down through the organization.

As educational programs have progressed from worker to foreman up the levels, there has been the standard plaintive cry "I sure wish my boss would take this course." General Electric's pattern of focusing the curriculum around the major emphases of current and company-wide administrative problems and opening the course to top level officers opens up an intriguing vista—administration by education.

1 L. A. Allen, L. A. Allen Associates
2 N. Barish, New York University
3 H. R. Bowen, Grinnell College
4 L. R. Boulware, General Electric Company
5 E. C. Bursk, *Harvard Business Review*
6 T. H. Carroll, Ford Foundation
7 G. B. Carson, Ohio State University
8 T. E. Clemmons, International Business Machines Corporation
9 D. E. David, Ford Foundation
10 C. R. Dechert, Purdue University
11 F. F. Drucker, New York University
12 J. E. Ellsworth, The Ensign-Bickford Company
13 A. H. Forster, Armstrong Cork Company
14 J. H. Forrester, Massachusetts Institute of Technology
15 L. Gulick, Institute of Public Administration
16 G. F. Habach, Worthington Corporation
17 J. R. Hawkinson, Northwestern University
18 M. L. Hurni, General Electric Company
19 E. H. MacNiece, Permacel
20 A. Matz, University of Pennsylvania
21 H. B. Maynard, H. B. Maynard Company
22 D. E. McFarland, Michigan State University
23 C. A. Myers, Massachusetts Institute of Technology
24 S. Ramo, Thompson Ramo Wooldridge Company
25 A. W. Rathe, New York University
26 J. P. Richmond, Mount Dora, Fla.
27 E. Shell, Massachusetts Institute of Technology
28 H. F. Smiddy, General Electric Company
29 W. R Spriegel, University of Texas
30 R. Villers, Rautenstrauch & Villers
31 L. F. Urwick, Urwick House
32 G. B. Warren, General Electric Company
33 G. H. Welsh, University of Texas

DISCUSSION

G. D. Lobingier[4]

This is an extremely well done report on the growth of management training and education, tracing the development of such programs from their beginning to the present. The shift in sophistication of content, from "how-to" techniques in the early stages to the present concern with broader subject matter, is to me as dramatic, if not more so, as the quantitative growth in the number of programs.

In the early part of the paper, I would have liked to have had some further discussion by the author, in his historical analysis of supervisory training (as distinguished from management training), of the reasons for the criticisms he noted which crept into evaluations of supervisory training. Were the reasons "absence of radical innovation in method or content," or was there some lack of understanding the basic principles of work situations which caused a disenchantment with courses which supervisors attend? The author's opinion would be most valuable.

Although on a minor point the author speculates very briefly on a possible "filtering-down" process from management education to supervisory training, my own point of view is one of reservation about any prospective effectiveness. What may be needed in such cases is not a direct application of novel practices but one which takes into account the levels of background, responsibility, and sophistication of the two groups—supervisory versus management.

The section of the paper discussing trends is most enlightening; the author has quite properly focused attention on these and underlined their importance to the direction management educa-

[4] Director, Educational Department, Westinghouse Electric Corporation, East Pittsburgh, Pa.

tion is taking. Included is the point strongly made of the lack of meaningful objective evaluation to the manager education process. Nothing of significance seems to be coming from the occasional efforts to evaluate; the efforts none the less are certainly indicative of the questioning, perhaps vague dissatisfaction, but confusion existing in the field. It occurs to me that the author has pointed out a curious contradictory phenomenon of "management education" unsystematically seeking a way to systematic management.

Finally, the paper points up the necessity for real effort on the part of industry to look hard, deep, and long at the quality and level of personnel to be trained or educated in the programs, to clear up the arguments pro and con for fundamentals versus techniques in content and methods, and to probe for basic principles and objectives of management education. Perhaps all three of these topics are more properly the subjects for an additional paper. I would have welcomed and valued, however, the views of Mr. Bradshaw, who is qualified to present them.

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Management Education—Colleges and Universities[1]

CHANGES in educational patterns in our institutions of higher learning come slowly. The university method, particularly in the classical fields of knowledge, is to look to the past and from it develop methods of instruction which undergo little change from generation to generation. In the fields of the natural sciences and in the educational programs for the professions, in spite of discoveries and new knowledge, long periods of time can pass when it is difficult to detect important change either in aim or method.

However, every now and again a decade will come when in some field of knowledge innovation occurs, a sharp change in direction appears, and new methods of instruction are evolved. In the medical world such changes occurred in the decade following the studies and reports of Dr. Abraham Flexner. The introduction of the case system in the teaching of law produced excitement in the law schools in the decade following its introduction at Harvard. And so there have been these times when, in some particular field, the spirit of criticism produced great change.

In the field of education for management the decade of the Fifties was such a period during which the universities and colleges having schools in this field underwent a soul-searching and self-criticism which in all probability will bring about marked changes. We shall look back on that decade as a time when schools of business and management had a reorientation which included both the aims of education in these fields and the methods by which those aims could be attained.

But it is necessary to take a brief look at the developments in the function of management itself in the last quarter century to understand the challenge thrown out to the schools for the preparation, through the process of education, of future executive leadership. Training for management, like training in all other professional fields, must be viewed against its proper background.

Management, as we understand the term today, came into its own during the Second World War. It achieved a new stature and new importance in our society. It cast off the shackles of what was called in an earlier period "scientific management," with its sound but nevertheless limited view, and assumed a role in the industrial world which it had not previously had.

For the sake of understanding what happened to education for management in the Fifties it is important to realize the shackles which scientific management had also imposed on business education. Briefly, in its view, there were only three basic materials out of which to build a curriculum:

First, there was the supposition, elaborated as part of the theory of scientific management, that there is an abstract theory of administration applicable with only accidental and circumstantial variations to all institutions. The general discussions of administration, delegation, standard control, scalar process, and the like, belong to this type of thinking and literature. In a word, there was no examination of the institution in which the manager functioned and not even a primitive realization of the inner logic of a business as the primary economic organ of our society. (Perhaps only the economists, in an attempt to develop a theory of the firm, were getting at this issue.)

Second, there was a body of assumptions about work, embodied in industrial engineering practice; i.e., minimization of task, purely financial incentive, basic design of work on purely analytical techniques such as motion-time analysis, and supervision viewed as the role of keeping such a work system running.

And third, there was a body of practice and how-to-do-it knowledge in certain classic, technical areas such as accounting, production, marketing, personnel, and the like.

None of the foregoing, nor the sum of it, described in any sense what a business is or what a manager does. And such contributions as were made by the emerging work in human relations during the Forties provided, mainly, palliatives to help human beings reconcile themselves to the system.

But business, itself, had already undergone radical changes. The production accomplishments of the Second World War for both the military and the civilian needs had never before been equaled in all history, both in absolute and in relative terms. And credit for this belongs in large measure to the American genius for management. It became what one writer on the current social-industrial scene called the "most important function in our society."

This genius did not characterize merely the top executive leaders, but showed itself throughout our industrial system. The war, and almost equally, the conversion back to a peace-time economy, matured us as an industrial society and in so doing matured our managerial capacities.

When the decade of the Fifties opened up, the senior executive leaders of industry, who had successfully guided their companies through the turmoil of the previous ten years, found themselves looking at a new world with clearly discernible problems of vast size and complexity in every phase of industry. Some of these proved leaders were tired; many more were approaching retirement; all were wondering about the future of their enterprises.

Where were the future executives to come from? The generation of leaders soon to pass out of active management had had an all-round experience which had matured them but which would be denied many, if not most, of their successors. Yet the conditions facing their companies called for great wisdom and skill to meet the competitive situation ahead brought about by a changing economic and social world.

Probably never before in the history of American industrialization had as much thought been given to the perpetuation of individual enterprise, both small and big, as occurred in the early Fifties. This, in itself, was a mark of the maturing of management.

Industry looked first to its own internal programs of training and executive development. Here again, there was a sharp break between the Forties and the Fifties. Management development, both as a reality and as a fad, was a post-World War II phenomenon. In the early years companies spent a great deal of money, time, and energy on internal programs which all had the same characteristics. (This was not strange since everyone had copied from Standard Oil.) Briefly, the first approach

[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

Contributed by the Management Division and presented at the Winter Annual Meeting, New York, N. Y., November 27–December 2, 1960, of THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Manuscript received at ASME Headquarters, July 18, 1960. Paper No 60—WA-62.

was characterized by an inventory of positions on an organizational chart, appraisal of people focused on strength and weaknesses, the preparation of replacement tables, and the development of the so-called "individual programs of development." The basic malorientation and limits of such an approach have been discussed elsewhere.

The most striking thing is that prior to 1950 not a single company had studied its own experience to discover under what conditions, historically, its managers had actually developed. The first three to do this in a serious, systematic manner were General Electric, United States Steel, and International Business Machines. These studies fall between 1950 and 1954.

In some ways a few universities in the late Forties were working toward the changes that were to characterize the Fifties. Harvard, for example, began its Advanced Management Program in 1943. The University of Chicago was experimenting with adult seminars for businessmen designed to help them think more liberally about their work and their institutions. Columbia had abolished its undergraduate school, redesigned the graduate program, and by 1949–1950 had begun the foundation form for the Executive Program at Arden House. The Sloan Fellowship Program at the Massachusetts Institute of Technology—really the first of the advanced management programs as distinct from typical graduate education for management—had been in continuous existence, save for the war years, since 1931; but it was not until 1952 that work began from within to reflect the trends I am attempting to identify here.

The significant thing in these forerunners to the Fifties was (1) an attempt to get at management as a kind of work, and business as an institution, and (2) to do this with adult, experienced businessmen in a format that had no precedent in American education.

By 1950, therefore, the focus of attention in education and in industry was shifting to the question: How should a company go about training and developing its people in the many complex functions of a modern enterprise embracing the fields of finance, control, production, marketing, and especially the integration of all of these into general management? It was natural that responsible managements sought to find how others, faced with the same needs, were tackling these problems. This accounts for the extraordinary growth during the decade of the Fifties of such organizations as the American Management Association and other organizations of industry with similar aims. These associations, through their programs in every phase of industry and at all levels of responsibility, afforded the opportunity for discussion of common problems of management and for making comparison of results obtained in different ways. To realize the use made of this outside help one may cite the growth of the American Management Association during the decade. Membership grew from 12,100 in 1950 to 28,000 in 1959 and the number of sessions from 209 with an attendance of 8700 in 1950 to 1100 meetings with 59,000 attending in 1959.[2] Here, also, there was adopted the new workshop seminars and management courses reflecting the new oral format for adult management education.

Thus the decade began with industry giving a new importance to the preparation of better executives for both present and future, being critical of the results obtained in the past, and seeking help from outside of its own corporate limits to meet the need.

It was natural that industry should look also to the schools of business, management, administration[3] for supporting aid in obtaining qualified beginners for management and for subsequent training of executives.

When industry began taking a critical view of the schools, what they found was far short, in the main, of what was wanted. Employment personnel were dissatisfied with the product and the many men from business and industry who reviewed programs often came away feeling something was lacking.

This critical attitude on the part of industry served in no small way to stimulate the self-criticism of the faculties of such schools with the product they were turning out, with the content of the programs, with the methods used, and with the intellectual standards maintained.

Many of our leading institutions of learning had undertaken extensive surveys of their aims, objectives, and methods of instruction during the war years when their normal programs had been interrupted. As a result of these studies in many universities, departments, and areas of instruction, sights were raised, greater breadth of program was demanded, and new standards of excellence called for.

Such critical reviewing by university authorities spread to the professional schools and probably no field came in for a harder look than was directed at the schools of business. It is interesting that this decade also ended on a note of continuing evaluation and criticism. In the last month of the last year of the decade, two of the great foundations published the results of their several years of study. Both the report of the Ford Foundation[4] and that of the Carnegie Foundation[5] identified some common bodies or areas of knowledge developed in leading university centers. Looking at the total of what is going on, they leveled severe criticism both as to the aim of most programs and the methods employed.[6]

This, then, was the background against which the schools of management commenced their critical review of the aims of such schools and how to better educate for the role of management in the years ahead.

Thus there had come to be general agreement, both by industry who employed the product of such schools, and by the faculties of such schools themselves, that a higher level of effort was needed to meet the needs of a maturing industrial society. No longer could such schools be the repository of those students who could not, intellectually, make the grade elsewhere. No longer was the attempted teaching of today's practices and techniques adequate to train men properly for roles of responsibility in management throughout a long career. Education, at the university level, for those who chose management for a professional career, needed greater depth, breadth, and vision.

It is the purpose of this paper to review some of the developments which took place progressively during the decade of the Fifties in the field of education for management in our institutions of higher learning. These developments will be taken up under the following headings:

1 The interrelationship between industry and the schools.
2 The age levels for training and development.
3 Curriculums.
4 Research in economic-managerial fields.

Interrelationship Between Industry and the Schools

To understand the first and most distinctive achievements in

[2] American Management Association Annual Report, 1958–1959, p. 6.

[3] There are schools of business, of commerce, of administration, and of management. Regardless of name, they have come to have much in common as to objective. In this review, the term "schools of management" will be used as representing a common denominator to all such educational institutions unless otherwise noted.

[4] R. A. Gordon and J. E. Howell, "Higher Education for Business," Columbia University Press, New York, N. Y., 1959.

[5] F. C. Pierson and others, "The Education of American Business Men," McGraw-Hill Book Company, Inc., New York, N. Y., 1959.

[6] It is interesting to note, as an indication of the changes during the decade, that, when the author of this paper became the first Dean of the newly launched School of Industrial Management at M.I.T. in 1951, he approached a number of important foundations seeking their interest and aid in carrying on a survey of business education. No interest was expressed at that time.

university education in this decade one must look not to the regular undergraduate or graduate programs, but to those entirely new institutions which appeared, with the exception of the Advanced Management Program at Harvard, in this decade. Without pretending to present a complete list, let me instance:

Harvard—Advanced Management Program.....1943
Columbia—Executive Program, Arden House.....1952
Carnegie Institute of Technology—
Program for Executives.....1954
M.I.T.—Senior Executive Program.....1956
Case Institute of Technology—
Management Development Program.....1956
University of California (Berkeley)—
The Program of Executive Education.....1959

In Europe, for example, which has long considered how to educate men for a metier, it was no novelty to have regular university courses to train men for administration. In America there were instances where we also had been good at this for many years. I have only to cite the Wharton School at the University of Pennsylvania, which was the first of all American schools of business and which, from its beginning has been renowned for the technical quality of its courses in those major specialities found in business. Leaders such as this are joined by a host of schools which train men in accounting, for production, for finance, with or without some sprinkling of humane subjects. While it helps for the student to have had some business experience, all of these subjects can be taught successfully before a man's first managerial experience. The same observation can be made of men already in management positions who have returned to school to take more advanced courses.

The new thing in the Fifties resulted from an approach from the other end. The moments of that change were as follows:

1 Business was looking to improve in number, but more in quality, men who were already experienced managers and at some level above that of simply supervising or running a limited and technically oriented operation.

2 As the result of the first studies made in the early Fifties, as well as research at university centers such as Ann Arbor, the awareness was growing that a manager, like a surgeon, must learn from experience and by practice. It is no accident that the most significant book of the decade in this field was Peter Drucker's "The Practice of Management."

3 The university schools, like those mentioned previously, developed advanced management programs exclusively for such a group of experienced managers. These courses all looked to the exchange of experience and the deepening of its meaning. Through seminars in human relations, history, and other liberalizing subjects, they helped the experienced manager understand his work in the larger context of human action. And while they frequently studied cases in marketing or production, by various means, they tried to get the manager to see the total running of his business and its relation to the culture, the society, and the world in which that business functions.

4 All of these programs broke with traditional academic format; i.e., organization of instruction by courses, subject areas, fifty-minute and one-semester time blocks, and the apparatus of credit points. All of them in one form or other advanced learning by using predominantly oral methods of instruction. Professors and students alike learned by talking to each other, discussing, challenging. This kind of adult education, which had been practiced by Socrates, Plato, and Aristotle and in some medieval universities, now reappeared after many centuries in America and in the Fifties.

The result was the establishment of a unique relationship between business and the universities where such programs were conducted. For business took mature and experienced men, long out of school, and sent them to the universities precisely to make their experience more meaningful. And those universities began to deal with the business institution and the managerial process in terms of the actual reality in which it occurred.

This flow, back and forth between business and the schools, was paralleled in the life of the managers by a similar flow and recycling between the world of thought and the world of action. By this process managers, who are by definition men of action, renew the sources of their action.

Most programs called for men of a common age bracket and usually for a like level of responsibility. Some programs were limited to a particular function of business while others were aimed at general management. In fact, cultural development without direct bearing on management problems was the substance of a few programs. The "students" were nominated by their companies based on their proved talents for administration and for their potential for growth in the profession of management. Men with such backgrounds have both the maturity and the experience on which sound education for management can be built. The best of such programs bring to the students new knowledge, new understandings of the economic and social world in which industry moves forward, and new methods and techniques for the solution of problems. It is unfair to call them "refresher" courses. If they fulfill their purpose, this term is a complete misnomer.

The annual descent on the schools of management of this highly selected talent, numbered by many thousands, and at considerable cost to each individual and to his sponsoring company, astonishes the stream of visitors from foreign countries who come here to study American management and management training.

And while the industrial community increased its demand throughout the decade for the aid of the schools, there was a noticeable leaning by the schools on industry for the contributions of thoughtful men active in the world of affairs.

The successful management man possesses qualities which, in our present state of knowledge, escape the usual classroom technique. How does one teach boldness, the willingness to take risk and bear responsibility, imagination, judgment, the importance of timing? Yet these are some of the intangibles of management which the successful executive must possess and exercise, and the higher in responsibility he reaches, the more important they become.

Although these qualities cannot be "taught" they must not be ignored in the educational programs. A necessary awareness can be furthered by exposure to men who are daily exercising executive responsibility—something rubs off. Increasingly throughout the decade, responsible, thoughtful, experienced industrial executives entered the classrooms and participated in the instruction. This willingness to do so, and the contribution made, marked the growing sense of responsibility for the development of the profession of management on the part of many men of management. Likewise, their presence speaks for the recognition by the faculties of such schools of the need, in an educational program such as they were devising, for assistance from the world of affairs. After all, sound education for the professions cannot be carried on successfully in a vacuum.

This interdependence of schools and industry in the education of the next generation of management, and in the successive echelons of management responsibility, is one of the significant developments of the decade.

Age Levels for Education for Management

The critical analysis made of our schools of management led to a shift in emphasis from undergraduate programs to graduate programs. As the body of knowledge in the field of management

and administration increased, it became apparent that justice could not be done to the professional demands in four years of undergraduate work since a large portion of such schooling should be devoted to a broad education either in the liberal arts or in the natural sciences and engineering. A manager must be first an educated man. Moreover, undergraduate students usually lacked the maturity to understand and comprehend management teaching. Both these factors resulted in the strengthening and enlarging of the programs at the graduate school level. Here the students, having successfully completed their undergraduate work with an AB or BS degree, had reached a maturity sufficient to better comprehend the more professional work in education for management. It became an encouraging sign that the number of college graduates desiring graduate work in preparation for management steadily increased during the decade. This is testimony both to a recognition of the growing professionalism of the field and to the importance of the field itself.

Undergraduate schools of business and management have not disappeared except in a very few instances, and their usefulness is still important but hardly at the professional level. Under the criticism that has been leveled at them, programs are being revised as to aim, what is reasonable to expect, content, and method.

A special note is in order about the undergraduate school of business. Contrary to expectations, not much happened to the undergraduate schools in this decade with one notable exception. In June, 1960, Notre Dame did graduate its first class under the program designed by Dean James Culliton and his associates at that university. In the belief that education for business in our society can be liberal, they have worked out a curriculum in which subjects like history, mathematics, philosophy, and psychology have been combined with a study of institutions and of modern business as an institution. This course does not make a man a manager, but it does prepare the undergraduate to orient himself in a liberal manner to a managerial society. This program holds forth promise for a renaissance in a useful undergraduate curriculum.

In summary, the years immediately preceding the decade evidenced a strong trend to eliminate, or at least to question, undergraduate schools of commerce or business. This trend took its power from the belief that management or business could not be taught to students without experience; that it might be useful for them to get technical courses in specialized business subjects, but that the function of the business schools should be larger than this; that undergraduate business education as then known contained few liberal elements. Interest in this question subsided by the Mid-Fifties though it is presently being revived.

The new advanced management programs, liberal and oral in their instructional approach and focused on the enterprise and the managerial process, were designed for two different age levels: First, the advanced management programs with participants in their mid-forties, men already approaching top management and function in responsible positions such as plant managers, comptrollers, general sales managers, heads of engineering components. Their programs aimed at giving them both a deeper understanding of the logic of the business as an entity and of major forces in the world to which their business must be related. Secondly, there were the management programs with participants typically in their mid-thirties. These were men who had already proved successful in a variety of jobs dominated by some speciality and who now had to begin to think in terms of the total business and learn how to make optimizing decisions as a condition of functioning at some higher level of responsibility. The revolution now taking place in general graduate programs of business reflects this latter approach.

Curriculums

The need for changes in curriculum and, in fact, changes in the concept of the role of the schools became increasingly apparent. How were the schools to make use of the growing bodies of knowledge? How was this to be taught? How were the schools to *educate for management* and at different levels of maturity and experience?

A clearer view was developed of what the schools should concern themselves with and what had best be left to industry itself. This led to a general movement away from courses depending heavily on today's practices and techniques and toward the development of a new approach based on fundamental principles and on the sciences underlying these principles.

The increasing attention given to the quantitative approach to the solution of problems in the component fields of management such as production, distribution, finance, and accounting led to greater attention to mathematics and modern statistics. Into the curriculums of many schools came courses resting solidly on mathematics and appearing under such names as linear programming, operations analysis, operations research, and the like. The laws of probability came in with their recognized applicability to forecasting.

Toward the end of the decade wide use was being made of our great computers for mass data-processing. The penetration into hitherto unreachable and hidden relationships in the business and economic processes is one of the great discoveries of the decade. Increasingly the high-speed computer will find its way into more dynamic teaching in advanced courses in management training.

Along with the increasing attention in the curriculums of our schools of management to the "hard" subjects resting on their mathematical base, came a stimulated recognition of the attention needed to be given to the human side of enterprise. It is trite but true to say that management is getting things done through people. Obviously, educational programs designed to assist those who are about to start up the ladder of management responsibility must include heavy emphasis on man himself and on his behavior in organizational structure. Man's motivations, his aspirations, require all the understanding which our beginning knowledge in these matters can provide.

Here the schools of management began to make greater use of the social sciences and take advantage of the work of the psychologists, sociologists, and cultural anthropologists. Men in these fields have developed means to scrutinize more systematically the structure of personality and behavior of men. These are the "soft" subjects in the curriculums of management. Much has yet to be learned and research in these fields is our great need. Recognition, however, by our schools of the attention which needs to be given to man himself was a promising result of the self-criticism developing throughout the decade.

Marked progress has been made in emphasizing the dynamic character of business and industry as against the more static view which often prevailed. The appearance of the subject of history taught in a context of leadership has made a significant contribution to giving this feel of the steadily moving character of industry in an ever-changing environment of economics and social change.

Because these new bodies of knowledge do not fit neatly within the pattern of functional subjects as previously taught, there seems to be a trend to develop clusters of courses around some significant focal point, for example, around the manager as a person in his relations to other human beings or around the business in its relation to the society or polity in which it functions. The two most notable examples of such innovation in curriculum design are probably represented by the work being

done at Columbia University Graduate School of Business and at Carnegie Institute of Technology Graduate School of Industrial Administration.

But as important a change as any occurring in the work of the schools is the recognition that the body of knowledge so rapidly accumulating in the field of management today deserves a rigor of approach that has been all too lacking in the past. Professional management training today calls for an intellectual discipline comparable to that demanded in the educational programs existing to serve the older functions of society, such as those of medicine, law, theology, and the military.

These are but some, but probably the most important, notable changes which have occurred in our new study of better educational programs for management leadership of the future. All of these new developments have been aimed at the contribution the university world can make, not for the first job the student may obtain, but as a preparation for his career, and thus be useful to him throughout a lifetime.

Research

The emergence of many of these new approaches in the educational programs for the development of management leadership rests on the productive research in those fields which were becoming increasingly important as the decade advanced. As the competence of our faculties has increased, as scholars have found more and more fertile fields for discovery, research has shown its important head in many areas. It is on this emergent spirit of research and inquiry into this function of management that the hope of a continuing vigorous educational program lies. But more than this, it is through the product of our research that the schools of management will assert their leadership and come into their real, significant, contributing role to the advancement of American industry and our way of life.

In this review of the stepped-up interest in education for management during the decade of the Fifties and what has taken place in the schools of management in our colleges and universities to improve their programs, the author has not intended to give the impression that the decade ended with our educational programs all in order. This is not the case. Certainly the critical analysis of our schools of business has brought about much improvement, and we start the Sixties with a clearer concept of goals and methods of approaching them. But progress has not been uniform across the broad educational front. It has become crystal clear that increased research is needed both in subject matter and in teaching methods. We need more experimenting in the classrooms. Responsibility rests heavily on the better known and better equipped schools of the country to lead in research and experimentation and in setting standards of excellence.

The function of management, becoming constantly more scientific and more professional, demands the support and the intellectual leadership of the best educational system we can devise.

DISCUSSION

G. L. Bach[7]

Dean Brooks has summarized well some of the major developments in management education during the past decade. What I have to say in effect supplements his picture, by stressing two developments which he has mentioned but not emphasized.

The first of these is an educational focus that seems to me to have increasingly emerged at the leading schools—a focus which I call "managerial decision-making" and which some others prefer to call "training for managerial behavior." The second major development is the increased stress on fundamental research in the business schools.

Managerial Decision-Making as an Organizing Concept. Increasingly during the decade of the '50's, the leading business schools have, I think, come to recognize that their central teaching problem is the development of individual abilities to make and implement decisions on unknown problems with unknown, yet to-be-developed, analytical tools. In a world of rapid change, teaching today's best prevailing business practice may be useful, but it is not fundamental enough.

At Carnegie Tech's Graduate School of Industrial Administration, to cite only one example with which I am most familiar, we place primary stress on development of:

1 Orderly, rational problem-solving ability.

2 Basic analytical concepts—development of analytical "tools" and of understanding how to use them effectively in handling managerial problems.

This emphasis represents a major change in emphasis and direction in most business education. For it stresses managerial decision-making and managerial behavior, instead of specialist training and instead of men who can talk about managerial behavior rather than doing it.

Orderly, rational problem-solving must be the core of any professional education, as engineers have increasingly agreed. This recognition is new in business education, as it was in engineering education a decade or two ago. But the second item is perhaps even more significant. Merely learning *how* to solve problems rationally is not enough. We in the business schools increasingly have learned that we must also provide rigorous analytical tools as the equipment for making better decisions and carrying them out more effectively. Thus, again at some of the leading schools, over the past decade increased stress has been placed on the underlying disciplines of the behavioral sciences (the foundations of human behavior and organizations), economic analysis, mathematics, and quantitative methods (especially modern statistics, together with accounting)—and on their use in managerial behavior. The parallel to the development of an effective interrelationship between the basic sciences (physics, chemistry, and mathematics) and engineering in the leading engineering schools is a close one.

Development of Fundamental Research. Until recently most research in the business schools has been largely descriptive, devoted primarily to describing and analyzing best prevailing business practice. But today major emphasis is placed on fundamental research at a few of the leading business schools. This research has reached out into related fields—especially into mathematics, the behavioral sciences, economics, statistics, and engineering—for concepts and approaches. Modern mathematics, to take an example familiar to engineers, has begun to play a central role in handling many types of managerial decisions, comparable to the role it plays in solving engineering problems. For example, modern research utilizing new developments in mathematics has produced decision rules based on mathematical models which handle production scheduling and inventory control problems more effectively than was possible by previous "human judgment" processes. As you know, digital computers have begun to revolutionize middle management activities, especially those involving large-scale data processing and increasingly those involving routine middle-management level decisions. In both cases, the underlying research has been done partly in the business schools and partly outside, but it would have been quite impossible without willingness on the part of the researchers to draw on modern mathematics and computer technology, only ten years ago foreign to the thinking of almost every business school in the country.

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Similar developments could be cited in developing new analytical tools in basic psychology and sociology, in economics, in statistics. In these cases it is not merely a matter of taking existing knowledge from the related disciplines, but rather of developing new knowledge and new analytical techniques from those areas which can be applied in handling business problems. Some of this research is extremely fundamental. For example, a major research project in my institution has involved the use of digital computers in analyzing human learning processes, including the now familiar attempts to make computers effective chess players. But our interest is far deeper. It is to understand better by simulation the learning and problem-solving processes that go on in the human mind and to develop ways of teaching more effective learning and problem-solving by humans. For these skills are the core of managerial behavior.

This is a very skimpy statement on the development of basic research in the business schools. Indeed, it is a misleading one, because it stresses only the leading edge of research at only a very small minority of the best schools. But I suspect it may be one of the most significant developments of the past decade.

Thomas H. Carroll[8]

The opening sentence of Penn Brooks' paper reads, you may recall, as follows: "Changes in educational patterns in our institutions of higher learning come slowly." This is peculiarly meaningful to me as I return to the university world in a dual general management and professorial role. The fact that he can make such an observation is both good and bad. We certainly need evolution rather than revolution in education, but the evolution should not be so slow as to constitute in effect a blind worship of the status quo.

Educators in a professional field such as management have a special responsibility for challenging the practitioners rather than following their thinking, as has all too often been the case in the past. Such a challenge may come from production of new knowledge, from developing ways to use such newly produced knowledge, or from re-arranging existing knowledge for productive use. As Mr. Brooks indicated, by the time "soul-searching and self-criticism" were undertaken by "the field of education for management . . . business, itself, had already undergone radical changes."

Dean Brooks has made a noteworthy contribution in his paper. His stated purpose was "to review some of the developments which took place progressively during the decade of the Fifties in the field of education for management in our institutions of higher learning." In considering the actual developments leading to the present structure, an analogy might be made with a tripod. The first leg would represent "regular" university education for the practice of business management at either the undergraduate or post-bachelor professional level. The second leg would embrace the executive or advanced management type of program. The third would cover the university doctoral programs in business. I believe that Mr. Brooks has overemphasized the second of these, while ignoring the third. Yet doctoral programs have been the source of practically all the new concepts and methods that have "revolutionized" business education during the past decade. The emerging emphasis on research to which Dean Brooks refers is itself principally a concomitant of the growth of doctoral programs in business.

Although I know about and share Mr. Brooks' thoroughgoing respect for Notre Dame's undergraduate business program, I consider it quite unfair to describe that program as "one notable exception in the undergraduate schools." Certainly the large-scale attempt to make really meaningful a liberal education for business at Northwestern and the experiment at Grinell College in the development of a group of courses that revolve about the concept of business as one of the principal institutions of contemporary society represent other important undergraduate exceptions.

After having spent about two decades as student and faculty member and some seven and a half years in a foundation with primary officer responsibility for its work in the field of business administration, I have become wary of the expression "innovation in curriculum design." I believe it is more useful to study emerging curriculum emphases. During the past decade I think one should refer to the *four* "most notable examples," which include Dean Brooks' two. They are:

1 Carnegie Tech's scientific emphasis (earlier approached, but not so highly developed, elsewhere).

2 Chicago's emphasis on the underlying disciplines and their application to business problems (earlier approached there and elsewhere, but not to the extent one currently notes at Chicago).

3 The societal emphasis of Columbia (earlier reflected by Harvard's emphasis on business responsibility, but not developed to the philosophical extent one currently notes at Columbia).

4 Harvard's clinical emphasis, looking upon the "case" far more broadly than in earlier decades.

Just as many other institutions may be characterized by one or more of these emphases, all four of those named very clearly reflect the emphases of the other three.

It is surprising to note Dean Brooks' statement: "In Europe, . . . which has long considered how to educate men for a metier, it was no novelty to have regular university courses to train men for administration." Perhaps there is a semantic problem here. Although Europe has long had commerce curricula which offered what I take it Brooks means by "technical courses in specialized business subjects," there was until very recently little or no attention to education for management or administration. European universities generally remained aloof from the field until after World War II. Indeed, the London *Economist* could say as recently as this past summer about Great Britain:

> It is taking a very long time to bring the British universities round to any extensive provision of courses—whether undergraduate, postgraduate or extra-mural—for business management. A beginning has been made, but we have nothing, either as sternly academic or as frankly vocational, to compare with the management training available in the United States.[9]

This exception is undoubtedly the curriculum in industrial management established on an experimental basis in 1959 by the Faculty Board of Engineering at Cambridge University. The typical school of commerce in Britain, just as in America and elsewhere, laid emphasis on training men for routine or at best departmental supervisory functions.

Unless he refers to the obvious fact that advanced students teach each other, I do not accept the author's statement that "increasingly throughout the decade, responsbile, thoughtful, specialized industrial executives entered the classrooms and participated in the instruction." I am not aware of any evidence to support such a generalization. Based upon my observations, I would hypothesize the reverse. I think there was actually less of such instruction during the past decade than before.

Co-operation between business and university is best carried out in research rather than in instructional activities, in my opinion. The exchange of information and improved communication between executives and researchers should be to their mutual advantage. With this thought firmly in mind, I accept

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[9] *The Economist* (London), August 20, 1960, p. 717.

fully the author's statement that "it is through the product of . . . research that the schools . . . will assert their leadership" and, I would add, maximize their contribution to improved management.

R. N. Lehrer[10]

Dean Brooks' analysis of management education is perceptive, and his presentation is excellent. I agree with the points he presents. However, I do feel that Dean Brooks has omitted a most significant development of the past decade—one which is already having some impact upon management education. It will have a pervasive influence upon management practice and education in the future. I refer to the *modern* concept of Industrial Engineering.

Although the objectives of university programs in Industrial Engineering (at both the undergraduate and graduate levels) are not to educate managers per se, it is a fact that management is becoming ever more involved with science and engineering from the standpoint of the technologies to be managed as well as from the use of technologies to effectively perform the management function. Management is coming to rely upon technical staff specialists to assist in the design and installation of new systems for producing and managing.

The decade of the '50's has seen the beginning of the end of the old style Industrial Engineering, mentioned by Dean Brooks as one of the "shackles which scientific management had also imposed upon business education." In its place is a more substantial activity, defined by the American Institute of Industrial Engineers as follows:

Industrial Engineering is concerned with the design, improvement, and installation of integrated systems of men, materials, and equipment; drawing upon specialized knowledge and skill in the mathematical, physical, and social sciences together with the principles and methods of engineering analysis and design, to specify, predict, and evaluate the results to be obtained from such systems.

The *modern* variety of Industrial Engineering concentrates upon the identification, analysis, and solution of significant problems facing management, drawing upon the best of the traditional Industrial Engineering supplemented by operations research, management sciences, and systems engineering. Many of the best examples extend well beyond the "production" area.[11]

Management is faced with a difficult task. One significant aspect deals with the effective exploitation of innovation and technology from the standpoint of the technologies to be managed as well as from the use of technologies to effectively perform the management function. Management education has not yet recognized the enormity of this task. It is my opinion that modern Industrial Engineering has much to offer in education for management.

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[11] For example, see D. G. Malcolm, "Application of a Technique for R and D Program Evaluation," *Operations Research*, vol. 7, no. 5, September-October, 1959; and *Management Control Systems*, edited by D. G. Malcolm and A. J. Rowe, John Wiley & Sons, Inc., 1960, New York, N. Y.

Fifty Years of Management—a Look Back and a Look Forward[1]

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The decade which this report discusses, the decade of the Fifties, has been a time of fulfillment in management. It has also been a decade of conclusion for historical trends. Now we are ready for new beginnings. There has been management, the direction of people in joint effort, since time immemorial. But "managing" as a distinct kind of work, the "manager" as a distinct organ of and function in society, and "management" as a specific area of thought and study are very new. The history of management properly begins only fifty years ago.

The Forerunners

This is not to slight the important work of earlier pioneers throughout the nineteenth century, work that parallels economic advance and industrialization. The republication of some of this work under the title "Classics in Management," by the American Management Association this year, has made us again conscious of this earlier, and often unjustly forgotten, work. At that, "Classics in Management," suffering from an Anglo-American bias, underplays the scope, seriousness, and importance of the nineteenth century thinkers in this field.

The earliest of them, Robert Owen, is still outstanding in the depth of his insight and the courage of his convictions. He is still, almost a hundred and fifty years after his model experiment in New Lanark, one of the most "progressive" managers and well up with the best of them today. But there was also Saint-Simon, the Frenchman, Owen's contemporary, who first saw the importance of the entrepreneur as the creator of wealth. There were, in the second half of the century, the Japanese, with Fukuzawa Yukichi the best known, at least in the West. Confronted with the need to excel in the techniques and economics of the West and yet desirous to maintain the social and cultural values of their own old and rich tradition, the Japanese were the first to think seriously about the social responsibility and function of the manager. Finally, toward the end of the century, there was our American, Henry Towne, with his emphasis on the wealth-creating contribution of knowledge and on the sharing of managerial experience.

These pioneers were by no means without influence.

Owen, to be sure, was so far ahead of his time as to have no imitators. New Lanark was a sensation; it never became an example. For a few years it was a popular tourist attraction; but, while there were many princes and crowned heads among the sightseers, the author has not heard of a single businessman who went there to find out what Owen was doing.

Saint-Simon, by contrast, was tremendously effective. To this day the basic philosophy and structure of management on the European continent bears his stamp, especially in its emphasis upon the difference between the "entrepreneur," that is, the bearer of financial risk, and the manager. Indeed though Saint-Simon's name is anathema to any good Marxist, Russian industry is organized on his concepts rather than on those of Karl Marx. Similarly Towne had profound influence upon the basic structure of management and enterprise in the United States. He may only have codified what already existed (whereas Saint-Simon created something new in the industrializing banker); but certainly the structure of American management to this day mirrors Towne's concept that the function of business enterprise is to use systematic knowledge in order to create economic value. The Japanese, finally, may have had the most important impact of all the earlier thinkers. By enabling a nonwestern country to become modern and industrial and yet to remain, in essentials, a nonwestern country with its own tradition and culture, they not only broke the western monopoly on economic and technical advance. They created the foundation for today's explosion of economic development. In many, and especially in its constructive aspects, the modern world is their creation.

And yet this is the prehistory of management, rather than its history proper. For there was one thing lacking in all these pioneers; namely, a realization that they dealt with something new and basically different, a realization that there was "management" as a distinct field, "managing" as a distinct kind of work, and "managers" as a distinct group and function. When we read their insights today, we are struck by them. But then we know something that their contemporaries did not know; we read something into these works that simply was not in them. Each of these pioneers found a nugget of pure gold but dropped it again, unaware of its value.

The Management Themes

This new insight, this new concept of managing as something specific, suddenly arose around 1910. In the ten years between 1910 and 1920, the decade of the first World War, every single one of the great themes of management is struck. Every single one of the six basic approaches to the study of managing and management was developed then. And almost anything we have done since then, in theory as well as in practice, is only variation and extension of the themes first heard during that decade.

Management, as a specific discipline, as a specific kind of work, as a specific function in society and economy, was developed, almost entirely, within the past fifty years.

Taylor's "Principles and Methods of Scientific Management" appeared in 1911. Together with his famous testimony before the Congressional Committee a year later, this converted what had been a technique into an organized, systematic, teachable approach to the study of work and of its rational organization. Almost at the same time Elihu Root, reorganizing the United

[1] Part of the report, "Ten Years' Progress in Management, 1950–1960."

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States Army, and Henri Fayol, reorganizing a French mining company, established the counterpart to Taylor's study of the individual task within a work force. They established the systematic study of organization to determine what tasks have to be performed. And at roughly the same time the Germans, especially Schmalenbach, developed *Betriebswissenschaft* (a term, incidentally, as impossible to translate out of the German as "scientific management" is impossible to translate out of the American); namely, the systematic study of the individual transactions which together make up the total economic results of an enterprise.

These three approaches look at enterprise and its management in isolation. But in the years after 1910, we also developed, for the first time, approaches that looked upon enterprise and management in society and economy. In 1911—at the same time at which Taylor's "Principles and Methods of Scientific Management" appeared—Schumpeter in Austria published his "Theory of Economic Development" which, for the first time, raised the question of the role of the manager in a modern expanding economy. Such recent "discoveries" as innovation, marketing, or long-range planning were all anticipated in this book. In the years before World War I, Walther Rathenau in Germany first concerned himself with the impact of large organization on modern society and with the responsibility of management in a modern society. His concern was echoed in the United States, in the closing years of World War I, by Henry Gantt.

The question of the individual in the plant community and the industrial organization was the first of the management themes struck—it was Robert Owen's main concern. It was, however, the last one to be tackled by modern management thinking. It was not raised again until World War I, most effectively perhaps by Elton Mayo, then still in Australia.

These themes have been the major themes of management ever since:

The systematic study of work.
The systematic study of organization.
The systematic study of effort and results.
Managerial and entrepreneurial economics.
The social position and responsibility of management.
The human relations of an industrial society and the place of the individual in it.

The New Themes

Each of these approaches was developed quite independently. Each has, essentially, remained separate to this day. Each has made great advances, especially during the last decade. The other sections in this report are primarily devoted to recounting and presenting these advances. It is not my intention to repeat what others, better qualified, have already said, nor to summarize their contributions which already are, in every case, a summary.

My job is rather to ask one question: Can these different approaches remain different much longer? Or are we fast reaching the point where we need what, so far, we have not achieved: a unified discipline of management?

There can be no doubt that we will have to learn—and learn fast—to consider these different approaches not as different disciplines, not even as different points of view, but simply as different pieces in the same tool box, every one of which is needed to do the job.

The new tasks with which the next decade will have to come to grips cannot be tackled by means of any one of these approaches. They demand of the "management scientist" that he know some economics—something he so far has staunchly refused to learn. They even demand of him that he know a good deal of human relations. They demand of him above all, that he realize that his job is not to make the universe rational—but to make the decisions of limited, fallible human beings a little more intelligent than they otherwise would be. And this implies, for instance, a great deal of concern with social and moral responsibility of management and business.

The same would have to be said for every one of these approaches.

The man concerned with the human organization, whether in terms of formal organization concepts or in terms of "human relations," had better acquire an understanding of managerial economics. He also had better acquire understanding of the basic concepts of quantification and formal analysis, of formal decision and information theory, for instance. Otherwise he, too, will not be able to come to grips with the tasks.

What are these tasks? We might perhaps distinguish them by major categories.

1 First, we find ourselves suddenly confronted with the amazing fact that we have always taken *top management* for granted, to the point where we know nothing about it. Perhaps this is not quite so surprising. In medicine, as a parallel, the brain was, for instance, taken for granted up until recently—if only because no one knew how to study it, let alone how to remedy brain disturbances, brain diseases, or malfunctions.

Actually the situation with respect to our knowledge of top management, that is, with respect to our knowledge regarding the unifying, determining, and deciding organ of enterprise and management, is even more confused. In the traditional approaches which focus on the function of enterprise in economy and society—the Rathenau line of concern with social responsibility or the Schumpeter line of concern with managerial and entrepreneurial economics—top management is the only thing that is seen. The enterprise itself is seen practically as an extension of top management. We know today that things are not so simple. The organization, even in a small business, is a good deal more than the extension of top management. We know, for instance, that the basic problem in the decision-making function of top management is not to make the decision itself. It is not even to get the "facts" about the decision. The basic problem is how to make a decision effective.

But, on the other hand, the approaches which deal with enterprise and management in isolation, the approaches that lead back to Taylor, Fayol, and Schmalenbach, respectively, do not see top management at all. To say, as is often said, that they are "mechanistic" is misleading. They are static—in the way in which a microscopic slide of cell tissue is static. This, of course, gives them the great analytical power they have. But it means that they are incapable of distinguishing between what is relevent and what is not; incapable, above all, of distinguishing between the decisions that mean life and death for an enterprise, and those that have to do with marginal efficiencies. These approaches quite properly point out that even the healthiest organization can die as a result of malfunction of the smallest, least observed operation. What they completely overlook is that even the healthiest organization in which everything functions properly cannot live, let alone perform, unless it has a different, a separate, and effective governing organ. They do not see top management either, in other words.

The function, organization, and work of the people at the head of an enterprise—and whether they are called "entrepreneurs" or, following the Americans, "top managers," is beside the point—it is the unexplored continent of management.

It is, at the same time, the most crucial question that faces us in practice as well as in theory. It is—at least it should be—the first item on the agenda for the next decade. That there is reason to be dissatisfied with our present state of knowledge, no one, I think, will doubt. At least I know no top manage-

ment of a large enterprise anywhere—in the United States, in Europe, or in the East—which is not in a state of continuous reorganization, of continuous questioning, of continuous dissatisfaction with what we know and can do today.

One question in the top management area is of particular importance: *The selection of the successors to today's top management people.* It is precisely because of the great success of management that this has become a critical question. For this success has made management of the large company a social and economic resource and power far beyond the individual company. A great deal more than the dividends of the stockholders, the price of the stock, or even the jobs of the company's employees hinges today on the questions: Who should succeed today's top management people? By what criterion should they be selected and by whom? In what manner and through what processes? Who will hold them accountable and remove them if they are found wanting? And no one, whether in management practice or in management theory, can give a satisfying answer to these questions.

2 The next group of tasks ahead deals with basic internal problems of enterprise and management. First, we are becoming aware of the *problem of manageability.*

There are, in all likelihood, limits beyond which an enterprise becomes too big to be managed, and particularly too complex to be managed. These limits may well be capable of being pushed outward by such new developments as organized information and decisions systems in the business, systematic business research, and systematic organization of self-governing businesses within the large enterprise. But there is, in all likelihood, a limit even to this.

In addition, there is the question whether every kind of activity and every kind of business really belongs in the large business enterprise.

Business enterprise is only one of the large power centers which have grown up in modern society. It is, incidentally, not even the one that has grown the most or the biggest. Modern government, in these past fifty years has grown at least as fast. The labor union has become a major center of power. So have the armed services in this age of the "absolute" weapons, or the government bureaucracy. But business is distinct in that there are both large and small units existing, working, and competing side by side.

This is obviously a unique strength—perhaps as important for the maintenance of a free society as the realization that society need not explode in the inevitable class war between the very many destitute and the very few rich. But it also presupposes some understanding of what kind of activity is best performed within a large business, and what had better be left to the small one. This, too, is a problem of manageability. On this, too, we so far can only ask a question, and cannot, so far, even define it properly, let alone answer it.

Another major area is that of *decision-making.* During the past ten years this has become a central focus of research and thought. For the first time we believe that decision-making can be made rational to some extent. At the very least, we can define the nonrational elements within it. But so far we have not succeeded in doing much beyond writing manifestoes.

One problem that is still ahead of us—one that cannot be tackled within any one of the traditional approaches to management—is that of distinguishing between "decision" and "decision." We do not speak of a "decision" that two and two make four; we call it the "right answer." In a good deal of modern decision theory, especially as applied to managerial decisions, we talk of "decisions" when there is actually only one right answer. This applies to all problems where the job is to restore or to maintain the operation at a preset level. These are the routine decisions—these we understand. But we understand them precisely because they are not decisions.

Then we have a whole group of decisions which I would call managerial in that they deal with the allocation of existing resources, especially of people. Here there is no right answer. Here, in other words, there is already risk. But here there is still a range of optimal solutions, each with a definable risk or balance of risks. Here, obviously, belong all the "inventory decisions" of which we now hear so much—and again these are not really decisions. These also are not, usually, the decisions which make a difference between survival and death of an enterprise.

But as to those last ones, the *entrepreneurial decisions,* we know very little. Here there is obviously no one right answer. There is not even a range of optima. There is only the ability to take the right risk—the ability, in other words, to innovate and change the trend rather than follow it or anticipate it. This, too, requires strict and rigorous mental discipline. But it is a very different kind of decision, requiring very different kind of "facts," and having very different impact from either routine or managerial decisions. Above all in this, the only truly critical decision, the aim is not to eliminate risk, indeed not even to minimize it, but to make the enterprise capable of taking bigger risks—but the right ones.

Finally, still within this area of basic internal tasks within the enterprise, we now have to bring together "management science" dealing with things, and "management" dealing with people. Unless we succeed in integrating into one analysis, into one thought concept, into one act of decision, the understanding of objective, impersonal, that is physical or economic phenomena, and the understanding of and concern with people, their development, their needs and desires, their dignity and personality, we will have no discipline of management. We cannot keep these two apart any longer, we cannot engineer data processing through a computer without thinking through who is to make what use of the data and why. We cannot, conversely, think through the role, function, and position of an individual in the organization without reference to objective, economic, impersonal contribution, and performance. So far we cannot do this—so far these two approaches are still separate, if not even incompatible.

3 A unified approach is needed for the new great tasks in respect to the *social and political problems of enterprise and management.*

During the past decade Towne's deep insight, seventy-five years ago—that knowledge is the wealth-creating resource—has borne fruit. Everywhere the professionally trained individual is becoming the real "labor force"—in cost as well as in numbers, let alone in contribution. The "laborer" of yesterday, with whom Owen was concerned first and whose work Taylor first analyzed, is rapidly becoming a thing of the past in modern industry. Work is increasingly being done by people with high education, contributing knowledge, and working with their minds.

We still tend to think of two classes in industrial society; i.e., "manager" and "workers." Harold Smiddy, in his section of this report, points out the danger in this. It is not only dangerous, however, it is rapidly becoming completely fallacious. The majorities of a modern industrial society are essentially the professional people who work, as nonmanagers, but also as nonlaborers, who are middle class though employed, and who see themselves as "part of management" without being "managers," and as "workers" without, in the slightest degree, considering themselves "proletarians" let alone exploited.

This is the social reality of the twentieth century—and its

social problem. Economically these people are not a problem. In that sense we can say that we have overcome the nineteenth century "social question." We know, at least, that it cannot be solved through any of the nineteenth-century prescriptions. But it can be solved through the unique twentieth-century prescription of economic development based upon high investment in knowledge and in the people who bring knowledge to work.

The position of these people, however, we do not yet understand. Nor do we know how to manage them, that is, how to make their knowledge, their efforts, their contribution effective in the performance of the whole. This is a problem which few, if any, of the founding fathers of management could have foreseen—Elihu Root may have been the only exception. It is a problem that only arose because they were so successful. But as problems of success usually are, this is a more difficult, at least a much more subtle, problem than any they tackled.

There is one more, and an equally important consequence of this tremendous shift in the social structure of industrial society. "Productivity" is beginning to have a different meaning and to require completely different approaches and concepts. We have had, especially in the past fifteen years, a great many "productivity centers" all over the world. What we will need from now on are, increasingly, "*effectiveness centers*"; that is, organized efforts to make fully effective and productive the new workers, the knowledge worker, the employed middle-class professional.

This, too, is a task for analysis and for careful study of the work. But it is different work. And both the approach and the tools will have to vary. For the manual worker productivity consisted in increasing output per hour or per dollar spent by organizing his task and his motion. For the "knowledge worker" the question is less how much he produces than whether he directs his attentions to the right "product." It is effectiveness rather than productivity that characterizes his economic contribution. And productivity itself in the knowledge worker is much less a matter of the individual doing more, as it is a matter of the group doing better. These are new things. So far none of us, whether we be Americans or Russians or Europeans or Japanese, knows how to do this.

We are, in respect to the work that is typical, characteristic, and wealth-producing in an industrial society, in exactly the situation we were in respect to manual work before Taylor. We need a new Taylor—though a very different one, not an engineer looking upon the human being with the analogy of the well-designed mechanical implement in mind, but the "systems thinker" looking upon human beings in a group as living, organic, moving parts of a whole where the whole has to be effective—and where effectiveness above all consists in doing the things that are really important instead of frittering away time and energy in doing things, no matter how well and how "efficiently," that are not primarily contributing to performance and to results. Here is one of our major frontiers.

4 And then there is the great political question of the *legitimacy of management*. On what ground does management base its authority? That management is not and need not be based on exploitation and force—that, in other words, the Marxist interpretation of history is not "scientific," let alone "inevitable"—even the Marxists today probably know. But it is not enough for a leading group not to be exploiter and usurper. It needs a ground for its power. It needs a code of responsibility and a focus of accountability.

It is not too relevant whether ownership and control have really split asunder, or whether there is still, substantially, control by ownership in modern industry. The fact of the matter is that management, as a function, has peeled off from the legal title to property ownership. Managing has to be performed, and performed professionally, objectively, and in the interest of the enterprise rather than in that of the owners, no matter whether the business is "owned" by one man, by the government, or by the anonymous multitudes of millions who have a diluted stake in the enterprise through insurance policies or future pension claims. It is also quite irrelevant how much power management really has. For there is no doubt that management has to have a considerable amount of authority to discharge its function, even on the strictest interpretation of managerial authority and responsibility.

And such power always must be anchored in a social value, in an ethical concept, and in a rational accountability, to be socially and politically legitimate power. We need management, this we no longer dispute (twenty years ago this was still a point of debate). We also know that management is only one group having power in modern society—in sharp contrast to the belief, common in managerial circles ten or fifteen years ago, that management should or could be the "power elite."

But we do not know how management's authority can be rooted, how it can be limited, and where those limits should be drawn. Here is a central task awaiting the student of management—a task, essentially of political theory, but one that cannot be tackled without a great deal of knowledge and understanding of management, its concerns, its functioning, its economics, organization, and philosophy.

The Exploding Management Universe

There is an entirely different, and perhaps even more compelling reason why we are at the end of the fifty-year period during which separate approaches to the study of management could, profitably, be pursued. *Management has become world-wide.* It is needed the most in those countries that do not have a managerial tradition, in the "underdeveloped" countries, primarily of nonwestern tradition and non-European population.

In the West management was a function and an organ which developed fairly late in the process of economic development. Certainly the consciousness of such a function developed very late—and so did the leadership group of "managers." In the underdeveloped countries, however, management is the central resource of development, and managers the central engine of development.

Management as a supernational function and discipline also goes back a good long time. It is forty years now since, as a result of World War I, two men founded the International Management Movement: Herbert Hoover, the mining engineer turned statesman, and Thomas Masaryk, the philosopher-historian turned statesman.

But essentially, up until very recently, management was seen as a phenomenon of the "developed" countries. And, by and large, despite the exception of Japan, it was seen as being confined to the "western" world, that is, essentially to countries peopled by nations of European stock.

Today, as no one needs to be reminded, this is simply no longer so. This is the greatest event, perhaps, in the short history of management. It is also the event that makes the greatest demand on our knowlege of management and on the dedication of managers.

Above all, it demands—and soon—a unified approach to management as a discipline and to managing as a kind of work. We face today, all over the world, a demand for people capable of doing the work of a manager—in tremendous numbers and possessing ability, knowledge, and integrity of a high order.

Just one example: British East Africa, soon to be independent, produces today, with tremendous effort, about twenty or thirty people a year capable of managerial or administrative work. It will need a hundred times this number each year within a

decade. Where will they come from? What will they learn? How will they be taught—and what?

We have been teaching "management" for fifty years. Indeed, management education, too, is half a century old—the Harvard Business School, the first one to be called "School of Business Administration" just celebrated its fiftieth birthday. But can we teach management? Can it be learned?

The one thing one can teach and learn, we lack so far. A unified discipline of management; a concept of the work of managing as technical, social, economic, and moral; and, above all, an ideal type of the professional manager who has technical knowledge *and* moral excellence, who can do *and* who can think, who can bring together people in common effort to produce *goods* but also to produce a good *society of free men*.

Decades and centuries as such are found in the flow of historical events as little as a centimeter is found in Nature. But in respect to management it is more than well-sounding cliche to speak of "fifty years of management." These past fifty years were the first fifty years of management, the years during which we developed a recognition of the discipline, the function and the work, and the first approaches toward rational understanding and professional competance.

This, the childhood and adolescence of management, is now at an end. If nothing else, the tremendous challenge of a world engulfed by the rising tide of human expectations demands of us a unified approach to management and the development of something that can be learned, can be taught—and, above all, can be admired and can give inspiration. If we do not succeed in developing this, the "first fifty years of management" may well be also the "last fifty years of management."

"Management" is the catalyst which makes possible rapid economic and social development in freedom and with human dignity. The alternative is no longer the primitive society without development—and perhaps with an occasional brief glimpse of human freedom and dignity. The alternative is rapid economic development through terror, through tyranny, through debasing the person to a cypher in the inhuman machine of total society.

The world-wide cry for economic development is in large measure the result of the management achievement. But this achievement also transformed management and, above all, the tasks it has to fulfill. What is needed now cannot be satisfied by technical excellence alone, but also not alone by moral responsibility or human relations. From now on "management science" and "scientific management," "managerial economics," and "human relations" will have to be made one in the theory as well as in the practice of management.

DISCUSSION

Frederick S. Blackall, jr.[2]

I wish that the techniques of successful management were so simple that they could be integrated into a single all-embracing formula of procedure, which would take into account at once every technical, social, economic, and moral consideration which might influence one course of action or another.

Alas, it is not so—at least within my experience. Management, like those other great disciplines, Medicine and the Law, is, I fear, an inexact science. And circumstances alter cases.

The professional manager does, indeed, face a dilemma on occasion in reaching decisions which are at once palatable to and compatible with the seemingly disparate interests of the corporate entity as such, the workers, the community, and the nation, as distinct from the stockholders or owners. I suggest, however, that if we really believe that free enterprise works, then we must believe that management should be working in the interests of the owners, in the broadest sense, not just because the owners are paying them to do so, but because, under our free enterprise philosophy, what is really good for the owners will prove to be good for everybody. If it is not, then, in the long run, the business will falter—as, indeed, it should.

The catch here, of course, is one of interpretation. When Charles E. Wilson stated before a Congressional Committee that "What is good for General Motors is good for the nation," he was not speaking in any narrow sense—nor am I; and in the broadest sense, he was right, or else free enterprise is wrong.

It is not alone in the field of corporate management that this dilemma arises, or that ultimate good is sometimes sacrificed to immediate, if illusory, gain. The conscientious labor leader certainly faces a dilemma when confronted with the union philosophy that the fate of this company or that is of no consequence, so long as the labor movement makes a "gain" (and I use quotes). But perhaps we shall yet see how wrong this philosophy can be. Is it, in fact, good for labor to secure annual raises which exceed any reasonably attainable increase in productivity? This sort of thing already has priced us out of foreign markets in many lines, and is not the least of the factors responsible for the recent attack on the dollar, which, if successful, could wipe out a decade or more of labor's so-called gains.

In the conduct of management, there is a certain empirical rule which separates the sheep from the goats. By and large, good management is what works. As Professor Drucker suggests, it must be the never ending task of scientific management to find out what techniques do work, with due regard to all of the complex factors which should affect decisions, and, so far as possible, to codify them. But how shall we do this in a "Single Unified Discipline"?

Some of the skills in this field are probably inherent; some can be acquired, as is attested by the records of the graduates of our leading schools of business administration. But I believe that the soundness and breadth of education, whether of the formal, or the do-it-yourself variety, and the higher level of thinking capacity which is engendered by such an education have more to do with the results than the specific techniques which successful managers have found in books or in the ivy-clad halls.

Basically, the essential characteristics of a good manager always will remain these three—intelligence, initiative, and judgment.

Intelligence—the possession of a powerful thinking muscle, which, like any other tendon, is strengthened by systematic exercise.

Initiative—the habit of doing the things which need to be done without being forced to do them.

Judgment—a good batting average in making the right decisions, coupled with the courage to recognize mistakes, and the intellectual capacity to analyze their causes and avoid their repetition.

Perhaps in our differences over how to synthesize sound management, there is a parallel in the endless debate over what constitutes a proper education for an engineering career. One school believes in teaching the fundamentals; the other stresses applied courses. For my part, I am a fundamentalist.

And so, in management give me a man who can think straight, one who will do things, one whose judgment is rather consistently good, and I'll take a chance on his ability to run my company with due regard to the interests of the workers, the community, the nation, and the owners, alike. His right to authority will be too obvious to question, because it will come from within; and when it comes to the test, he will measure up to all of the stand-

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ards which the most ardent apostle of scientific management could conceive.

If my man lacks these qualifications, no formula will do him very much good, because he either won't understand it, or, if he does, will not know how to use it with wisdom and discretion.

B. E. Goetz[3]

Almost always when I read Peter Drucker, I begin by being irritated by his free and easy rearrangement of facts and history to support his argument, and end by being fascinated by the breadth of his argument, by the flashes of deep insight with which it is illuminated, and by the raciness of his style. And, I conclude that in this context perhaps facts and history do not much matter. It is the emotional and inspirational impact—the breadth of view and the sparkle of insight—that counts. His poetic license, his distortion of history (to dramatize his ideas) are most effective, and should be forgiven or even applauded. Peter Drucker is surely the oustanding master of the "pep talk." He exhorts his management teams to "get in there and fight, boys," and he leaves to the assistant coaches the tasks of drilling candidates for the team in the fundamentals of the game, and of working out and teaching the plays that should produce touchdowns.

"Management" is not quite so recent as Drucker alleges, nor was its advent quite so explosive. The drama is heightened by having Minerva spring full-armed from the brain of Zeus, but management science was not born that way. The idea of the concept of management emerging in the decade of the First World War will not stand up. The University of Pennsylvania was teaching business administration in 1881, California and Chicago in 1898, and there were a dozen such university schools by 1910—the beginning of Drucker's first decade of management. Drucker puts the first concern over the social consequences of big business in the closing years of World War I, neglecting the popularity of Teddy Roosevelt's "trustbusting" a decade or two earlier. He reports no interest in or progress on the work of top management—"the unexplored continent of management"—until the very present, neglecting the not altogether unworthy efforts of Oliver Sheldon; James O. McKinsey; Holden, Fish, and Smith; Chester Barnard; William Newman, to name a few of the most outstanding students in this area. Incidentally, neolithic man showed interest in the brain by trepanning skulls to relieve pressure on the brain caused by fractured skulls, and perhaps to relieve headaches or to cure epilepsy.

Drucker is dissatisfied with our knowledge of top management—as well he should be—but cites as evidence the "state of continuous reorganization, of continuous questioning, of continuous dissatisfaction with what we know and can do today." If the facts were otherwise, Drucker would be the first to blast the static, the moribund, the unadventuring state of affairs. This continuous reworking, challenge, search seem to me to be signs of health rather than indications of a deplorable condition. Moreover, we find precisely the same kinds of redesigning, continuous questioning, and continuous dissatisfaction with product design and with technical processes. Only on such a basis can improvement come about.

Nor can I accept Drucker's notion that there are limits to the extent to which existing limits on size can be pushed. Postal systems, bookkeeping, roads, railroads, steamships, telephones, airlines in the past have extended these limits, and today operations research, systems analysis, and computers are extending the limits. I do not know what the future will bring and I do not think Peter Drucker knows. I do hope he is right. I do not want the limits extended until all economic activity of this world has been swallowed into a single, centralized, monolithic enterprise!

Drucker's treatment of "decision making" leaves me puzzled. I think he is saying that rational decision making is desirable, but a self contradiction! That when decision making becomes rational, it ceases to be decision making but becomes merely an algorithm for finding the right answer. In any event, I believe McKinsey and others were making managerial decision making more rational more than 30 years ago when they developed budgeting, first as a means of managerial control and subsequently, by comparing budgets of alternative plans, as a means of managerial planning. Incidentally, the budgetary approach to managerial planning is not basically different from the Operations Research approaches of today, except possibly that budgetary processes tend to be more top management and less static. If done correctly, both incorporate a great deal of micro-economic analysis; the requirements as to the classifications and evaluations of data to be used are identical, and are full of such economic concepts as incremental revenues, costs, and investments; opportunity costs; fixed and variable costs, this division depending upon the dimensions of the managerial problem and upon the time horizon of management.

Again, the merger of "management science dealing with things" and "management science dealing with people" is further along than Drucker seems to realize. A start toward consolidation seems made in "work simplification" (as contrasted to motion study), and in developments toward "participative" or "consultative" or "bottom up" management—starting at least as early as the Gilbreths' work councils, and Mary Follet's "authority of the situation."

Let me conclude by strongly endorsing the tune Drucker sings. I may quibble about unimportant facts; but the orientation and the basic concepts seem thoroughly sound to me. He is surely on the side of the angels—for motherhood, and against sin. And, I count myself as in the same ranks.

Glenn B. Warren[4]

Professor Drucker gives a most interesting and useful historical review of the development of management theory over a period even greater than the specific half century now under consideration.

This paper brings out several important points which it seems to me may make an important beginning at the establishment of a better understanding of the entire management problem in all of its depths.

To indicate, as Professor Drucker does, that there are areas where we do not know the answers, but will seek them, is the beginning of wisdom in any science. I am referring here specifically to the problems of organizing and managing those who are working in the engineering and scientific fields, and particularly in the areas commonly referred to as Research and Development.

For example he states:

> "organization, even in a small business, is a good deal more than the extension of top management. . . . . .
> Work is increasingly being done by poeple with high education, contributing knowledge, and working with their minds. . . . . .
> We still tend to think of two classes in industrial society; i.e. "manager" and "worker." . . . . . It is not only dangerous, however, it is rapidly becoming completely fallacious.
> The position of these people, however, we do not yet understand. Nor do we know how to manage them, that is to make their knowledge, their efforts, and their contribution effective in the performance of the whole.

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We need a new Taylor . . . though a very different one."

The original Scientific Management work related primarily to the lower levels of management in the goods production type of organization. . . . Much of recent management studies have quite properly been related to the problems of top management, and even here Professor Drucker says "we know nothing about it." It has seemed to me further that much of recent management postulations are based upon the premise that management problems are the same up and down through the layers of authority from the top to the bottom, and that the men who manage must have the same characteristics irrespective of the level they occupy in the organization, or the kind of work that they are managing.

In my judgment management problems are not the same throughout the various levels of an organization, and more particularly are they different in connection with the areas involving creative scientific and engineering work as compared to areas involving routine or productive type of work. The personal characteristics of the various men involved should also be important.

In this connection I would like to call attention to an apparently overlooked paper which it seems to me has merit here. . . . I am referring to a paper on "Authority Structure and Organization Effectiveness" which has appeared in the *Administration Science Quarterly* of June, 1959, by Amitai Etzione of Columbia University in which he states that previously held management generalizations *"cannot be applied to professional organizations."*. . . . and further that he *"would like to suggest that in professional organizations the staff-expert, line manager correlation, insofar as such a correlation exists at all, is reversed"*. . . . *"Although manager orientations are suitable for the major goal activities in private business, the major goal activity of professional organizations is in its nature expertness."* . . . . . He further states that in such organizations *"Managers give advice, ... the final decision is . . . . in the hands of the . . . professionals."*

I believe that the solutions to most of these problems can be found in the application of four rather simple basic concepts:

(1) Recognize that the various management and leadership positions in a given organization, and in different organizations are different and present individual problems. . . Further that talented individuals are all different, and that it may be easier and more effective in many instances to "tailor" the job to the man, rather than to "tailor" the man to the job.

(2) In the top management of all creative professional activities arrange to have two nearly equal heads. . . one administrative, and the second technical or professional. This second man to have the title "Director" or similar, and have responsibility for the top level direction, teaching, and decision making.

(3) In order to meet the imperative needs of right decisions in the professional areas the critical decisions and choices of direction should be made not at the "lowest level where the . . . needed skills, competence, and information exist," but rather at the *highest level of proven competence and experience in the area under consideration.* The power of example and right leadership so made available will then continuously build this competence and experience further down in the organization. The "effectiveness" of a professional organization which Professor Drucker speaks of can be increased many fold by this procedure.

(4) In connection with the recognition of "two parallel paths" for a person's career, one in management, the other as an "individual contributor", or "expert" professional, we should generally recognize that there is a third route of infinite variety in between these two where properly qualified individuals can progress from individual contributor status through various stages of leadership and direction of others by virtue of their own at the time superior competence and experience in the specific fields under consideration. This will do much to increase the effectiveness with which an organization can work, and will open a path for progress to able young people while still pursuing the creative functional work of their choice.

The actual experience of most engineering, scientific, and research institutions in operation today seems to indicate that this is the way they actually have to work. Recent management theories that this is improper have been unnecessarily upsetting, and clarification in Professional Management thinking in this area would be most helpful. Professor Drucker's paper indicates that this may be coming about.

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MATERIALS HANDLING HANDBOOK

In this authoritative guide has been condensed and organized virtually the entire literature of modern materials handling, stressing the economies and short-cuts of the greatest importance throughout the industry. In short this handbook provides the means for making a scientific efficiency check on every phase of operation.

Contents: Definition and Scope. Analyzing Materials Handling Problems. Materials Handling Factors. Factory Planning. Materials Positioning in Production. Materials Handling Research. Materials Handling and Production Control. Communication Systems. Training Personnel. Handling Bulk Materials. In-Process Handling of Bulk Materials. Unit Handling for Various Shapes. Unit Handling in Manufacturing. Scrap Classification and Handling. Uses of Containers in Industry. Industrial Packaging, Palletization. Warehousing and Yard Handling. Truck Terminal Handling. Air Terminal Handling. Belt Conveyors. Elevating Conveyors. Chain Conveyors. Trolley Conveyors. Cable Conveyors. Haulage Conveyors. Vibrating and Oscillating Conveyors. Pneumatic Conveyors. Package Conveyors. Portable Conveyors. Fixed Cranes, Derricks, and Cableways. Traveling Cranes and Towers. Portable Cranes. Elevators, Winches. Auxiliary Crane Equipment. Positioning Equipment. Powered Industrial Trucks. Industrial Hand Trucks. Industrial Tractors. Highway Trucks and Truck-Trailers. Railroad Freight Cars. Marine Carriers. Air Carriers. Pallets and Containers.

1958 $20.00

AMERICAN STANDARD PALLET SIZES

This standard has been developed to provide more flexibility, more uses for pallets, maximum utilization of loading space, and reduction in returns of empty pallets. The eleven pallet sizes recommended (eight rectangular and three square) include four sizes under consideration by the International Organization of Standardization, as well as those used by companies and the military services. Charts are included to show relationships of pallets to the inside area of the modern carrier equipment, and to the weight and volume of goods which could be carried. **MH 1.1—1959 $2.00**

SPECIFICATIONS FOR FREIGHT CONTAINERS

This new American Standard gives the length, width, and height of a series of van containers for noncaptive use which, in the opinion of the committee making the selection, will provide the maximum of efficiency, economy, and interchangeability when used in the U. S. A. air, highway, maritime, and rail transport service. **MH 5.1—1961 $1.00**

SAFETY CODE FOR POWERED INDUSTRIAL TRUCKS

The safety requirements in this code relate to elements of design, operation, and maintenance of power driven trucks used to carry, pull, lift, stack, or tier material. Specific safety rules for truck operators are given which, if followed, should reduce in-plant accidents. Additionally the standard includes a series of tilting platform tests for determining longitudinal and lateral stability of fork trucks. **B 56.1—1959 $1.50**

For engineering requirements, basic reference data, and formulas for the safe design and construction of piping systems, look to these American Standards

GAS TRANSMISSION AND DISTRIBUTION PIPING SYSTEMS

The rules of this code apply to the design, fabrication, installation, testing, and the safety aspects of operation and maintenance of gas transmission and distribution facilities, including gas pipe lines, gas compressor stations, gas metering and regulating stations, gas mains, and gas service up to the outlet of the customers' meter set assembly; gas storage equipment of the closed pipe type; gas storage lines; and the conditions of the use of the elements of piping systems.

B 31.8—1958 with 1959 Addenda $2.50

OIL TRANSPORTATION PIPING

Within the scope of this code are liquid petroleum pipe line transportation systems, including all piping carrying crude oil, petroleum products, and liquified petroleum gas between producers' lease tanks, terminals, refineries, natural gas plants, other delivery and receiving points; liquified petroleum gas storage facilities of the closed pipe type, fabricated from pipe and fittings, and their interconnecting lines.

B 31.4—1959 with 1959 Addenda $2.50

PETROLEUM REFINERY PIPING

The code covers all piping within the property limits of a petroleum refinery, loading terminal, gas processing plant, bulk plant, compounding plant, or refinery tank farm, any of which are engaged in the processing and handling of petroleum and related products. It also covers interconnecting lines between separate sections of a refinery.

B 31.3—1959 with 1959 Addenda $4.00

The provisions in B 31.3 and B 31.4—1959 are for the design of component parts and assembled units, including the necessary supports; evaluation and limitation of stresses, reactions and movements associated with pressure, temperature, and external forces; fabrication, assembly, and erection of the systems; testing and inspection of elements before assembly or erection, and the completed system after erection. The requirements in these 1959 documents supersede those in the 1955 Code for Pressure Piping.

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